FIG. 1

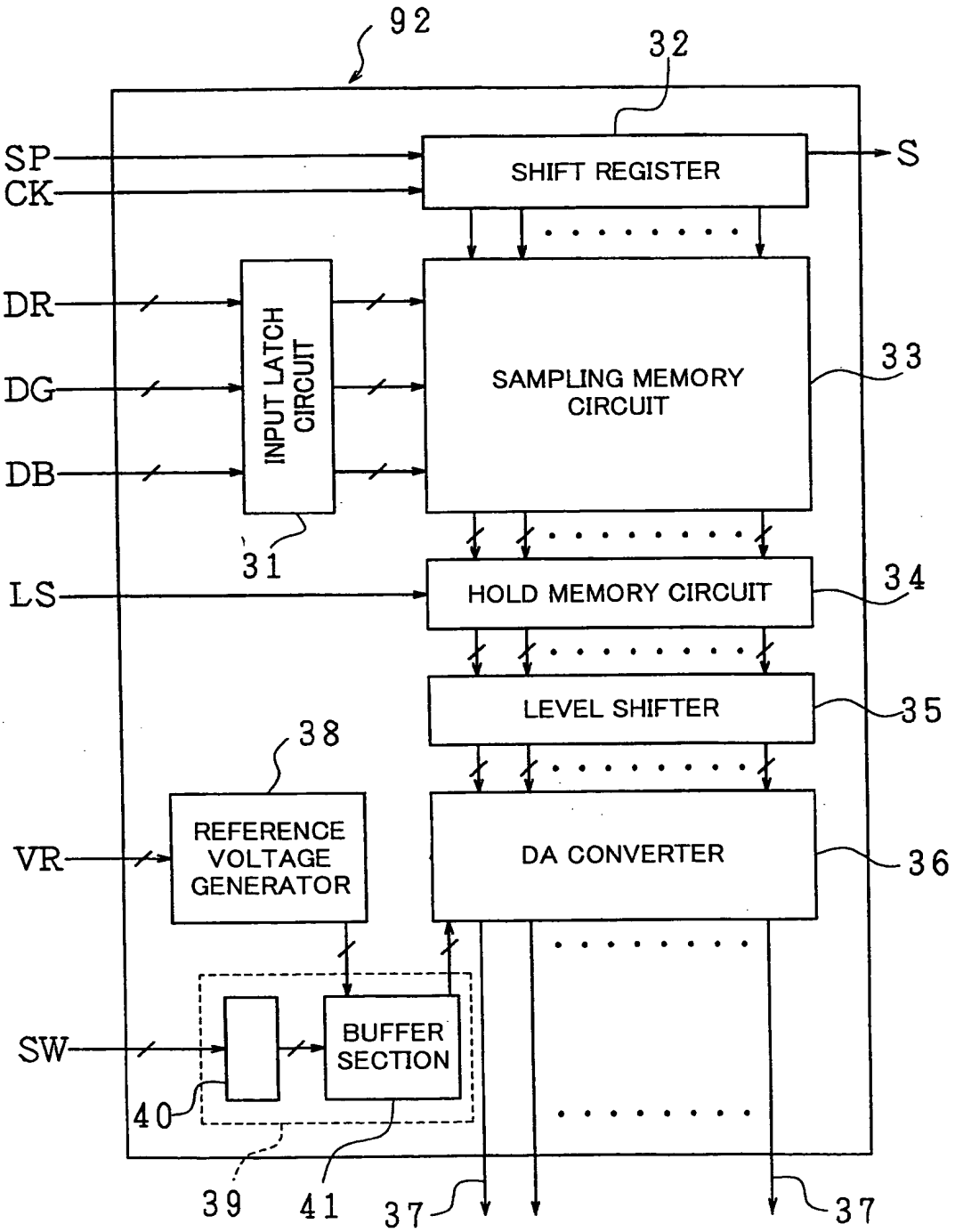

92
32
SP
CK
SHIFT REGISTER
S
DR
DG
DB
INPUT LATCH CIRCUIT
SAMPLING MEMORY CIRCUIT
33
31
LS
HOLD MEMORY CIRCUIT
34
LEVEL SHIFTER
35
38
VR
REFERENCE VOLTAGE GENERATOR
DA CONVERTER
36
SW
BUFFER SECTION
40
39
41
37
37

FIG. 2

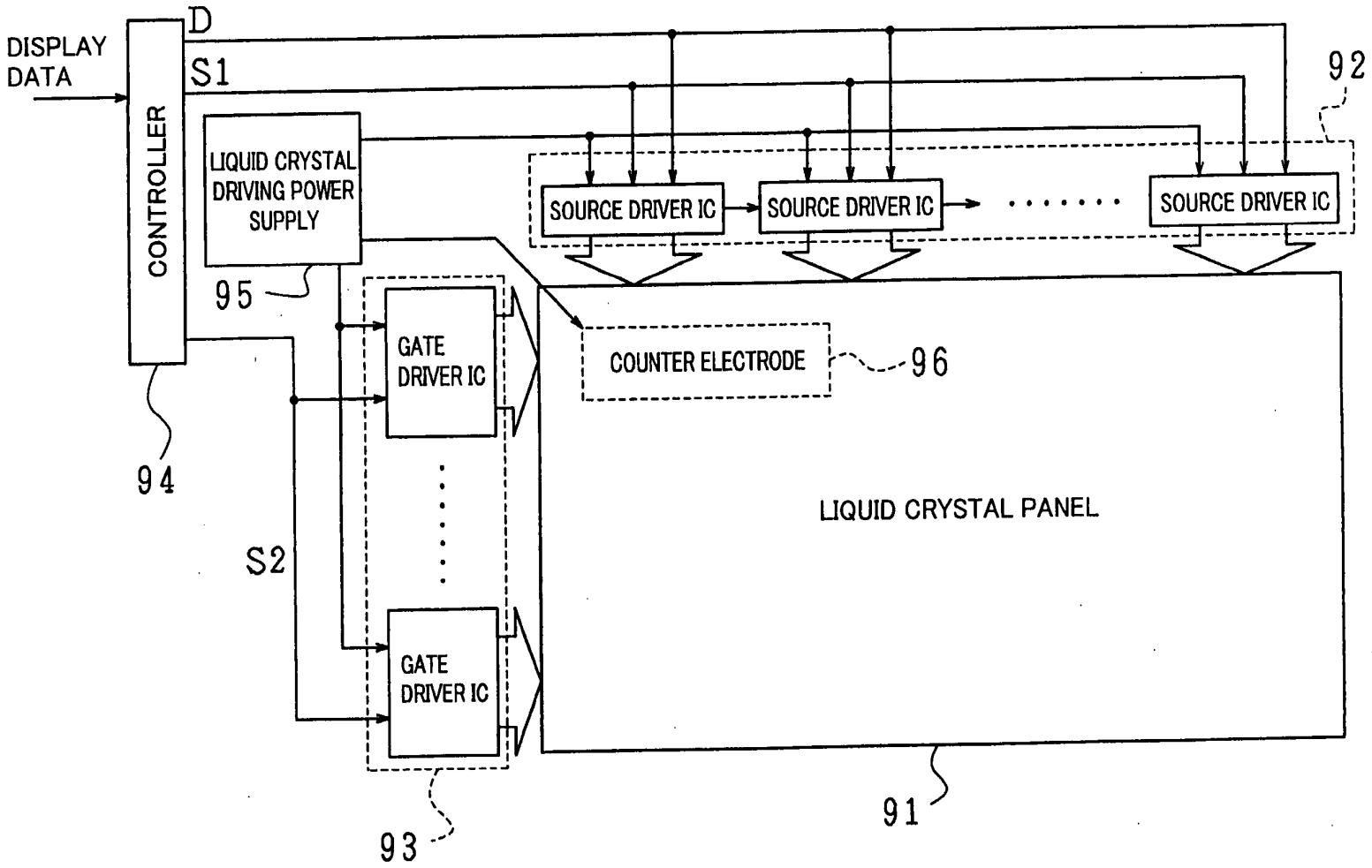
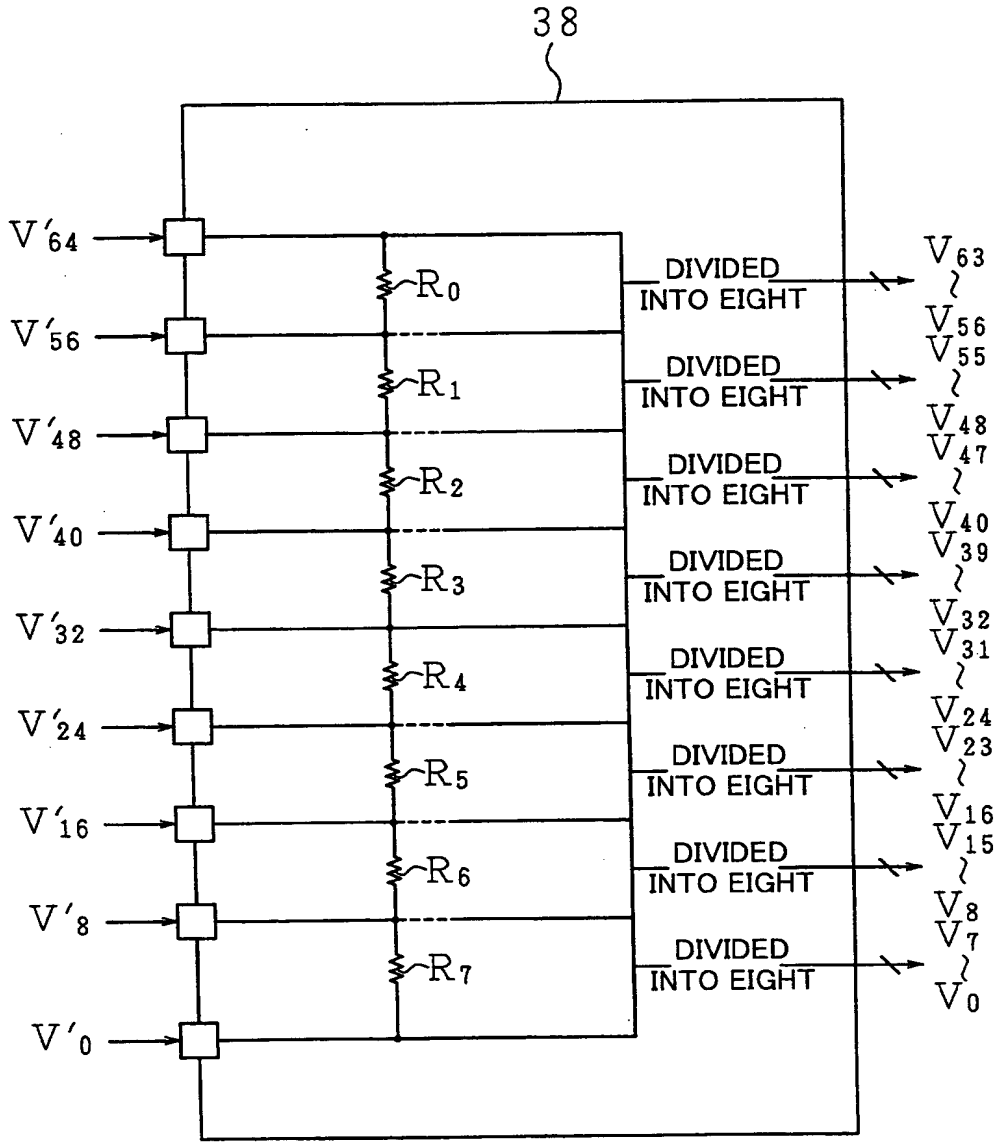

DISPLAY DATA
D
S1
CONTROLLER
LIQUID CRYSTAL DRIVING POWER SUPPLY
95
94
92
SOURCE DRIVER IC
SOURCE DRIVER IC
SOURCE DRIVER IC
GATE DRIVER IC
GATE DRIVER IC
S2
COUNTER ELECTRODE
96
LIQUID CRYSTAL PANEL
91
93

FIG. 3


38
V'64
V'56
V'48
V'40
V'32
V'24
V'16
V'8
V'0
R0
R1
R2
R3
R4
R5
R6
R7
DIVIDED INTO EIGHT
DIVIDED INTO EIGHT
DIVIDED INTO EIGHT
DIVIDED INTO EIGHT
DIVIDED INTO EIGHT
DIVIDED INTO EIGHT
DIVIDED INTO EIGHT
DIVIDED INTO EIGHT
V63
V56
V55
V48
V47
V40
V39
V32
V31
V24
V23
V16
V15
V8
V7
V0

TO2TOT" 0T6h2660

FIG. 4

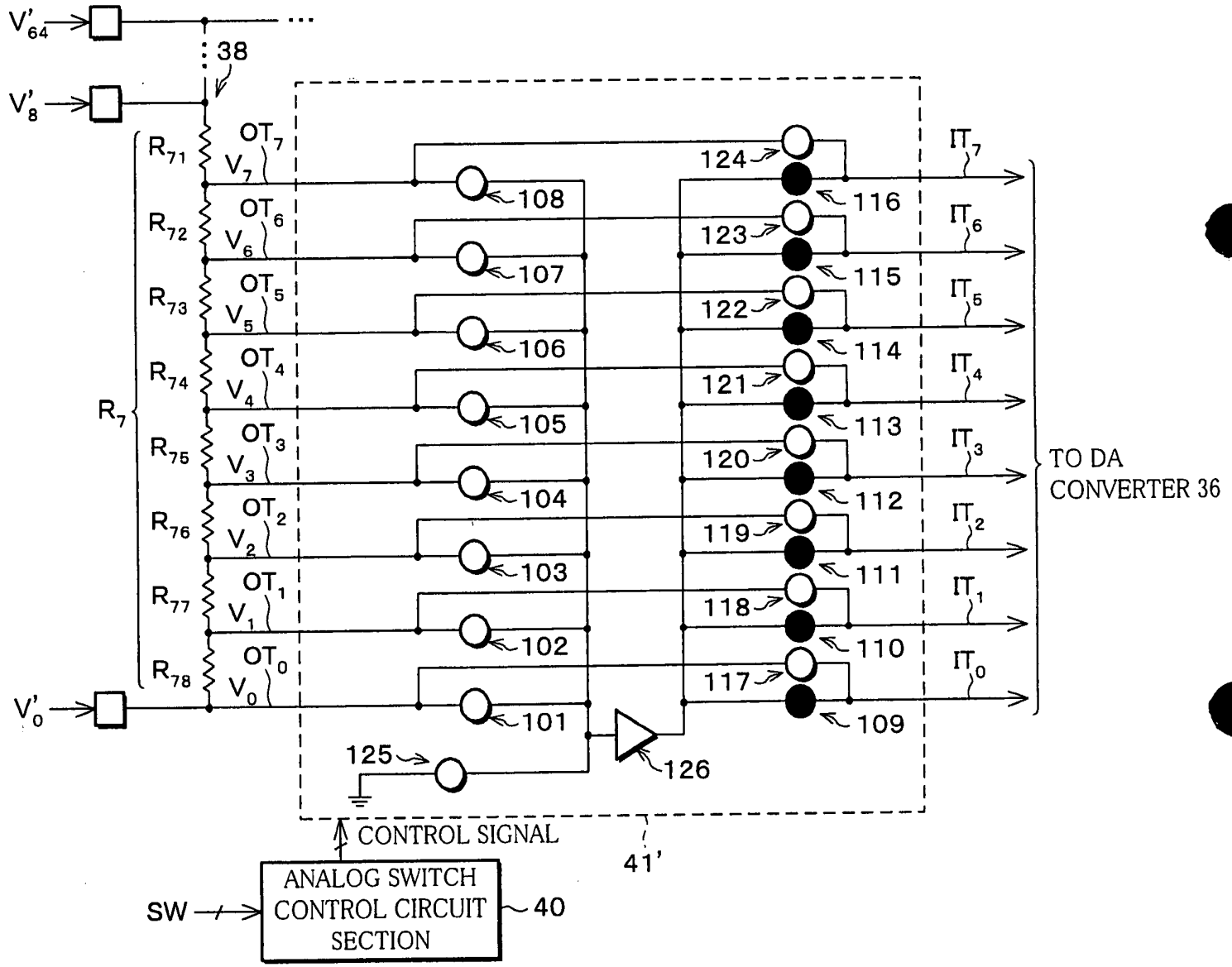
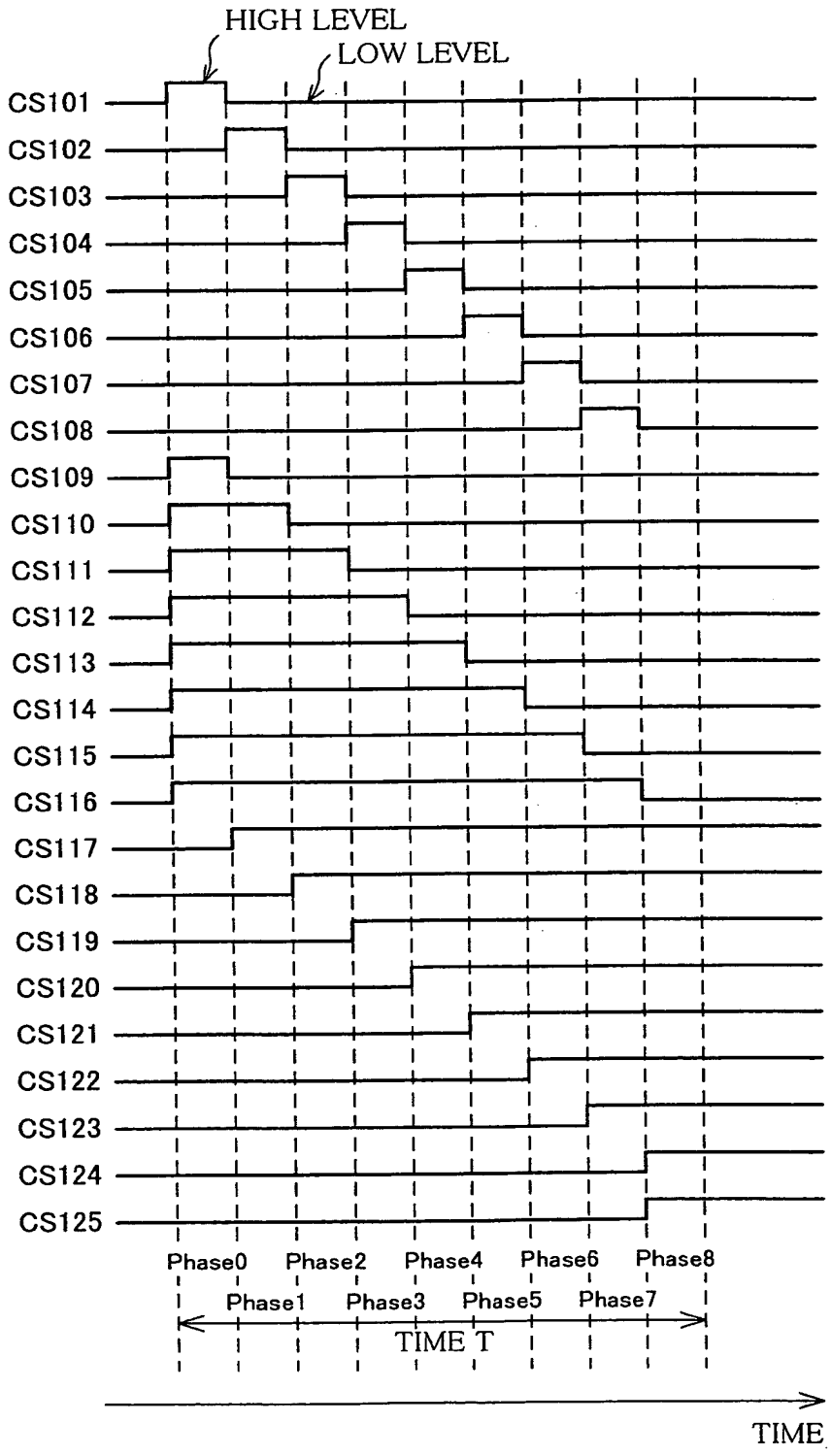


FIG. 5


HIGH LEVEL
LOW LEVEL
CS101
CS102
CS103
CS104
CS105
CS106
CS107
CS108
CS109
CS110
CS111
CS112
CS113
CS114
CS115
CS116
CS117
CS118
CS119
CS120
CS121
CS122
CS123
CS124
CS125
Phase0
Phase1
Phase2
Phase3
Phase4
Phase5
Phase6
Phase7
Phase8
TIME T
TIME

JP2007-086660

FIG. 6 (a)

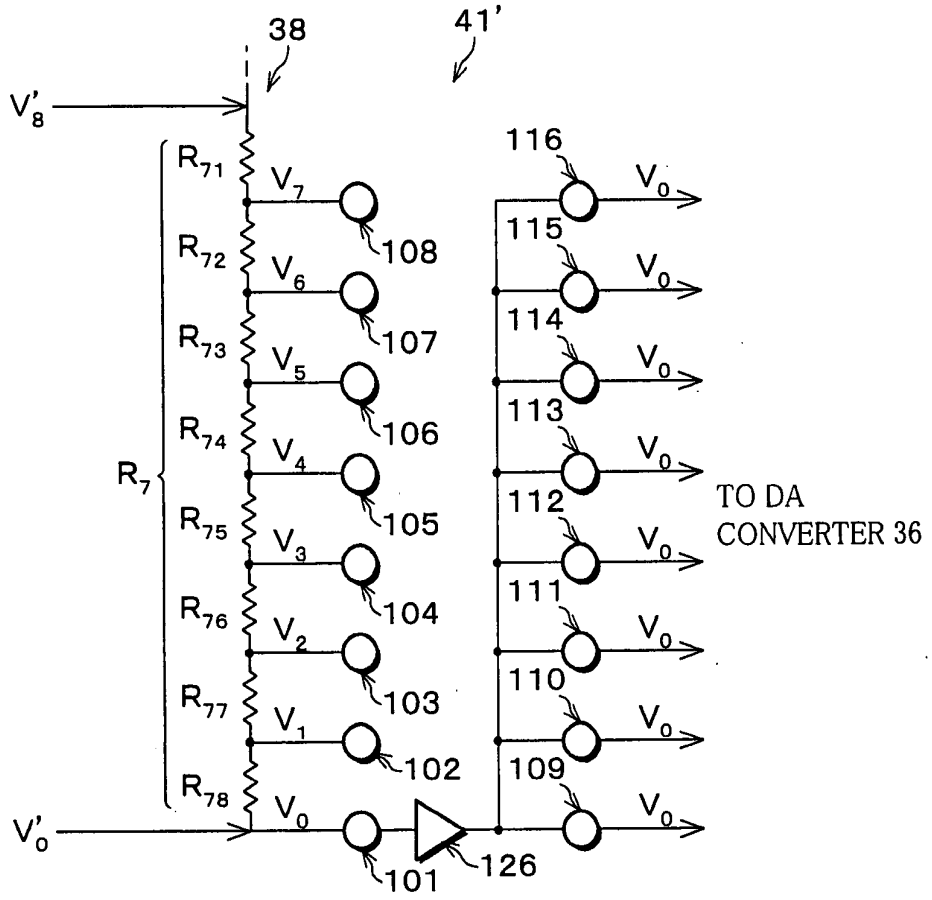


FIG. 6 (b)

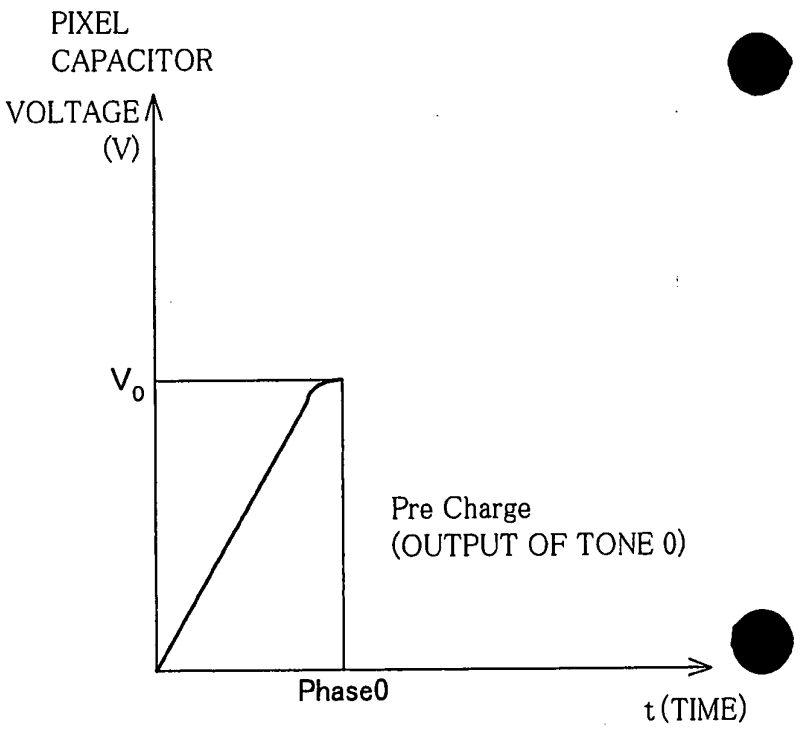


FIG. 7 (a)

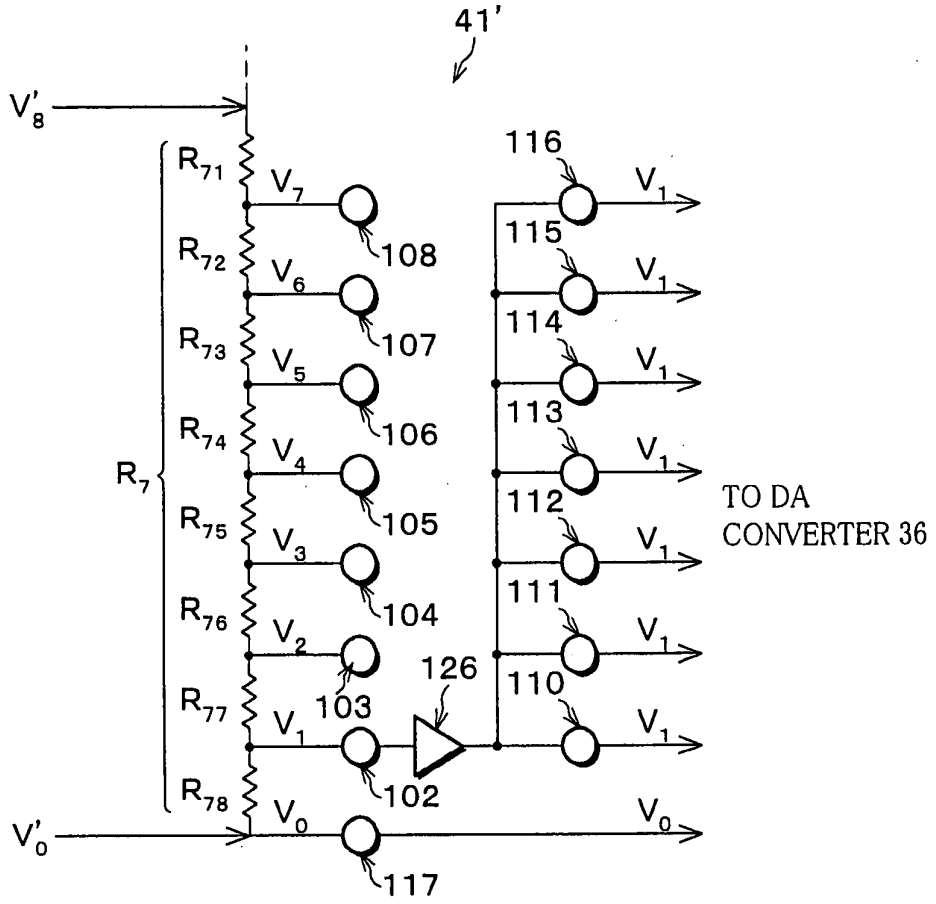

41'
V'8
R71
R72
R73
R74
R7
R75
R76
R77
R78
V'0
V7
V6
V5
V4
V3
V2
V1
V0
108
107
106
105
104
103
102
117
126
116
115
114
113
112
111
110
V1
V0
TO DA
CONVERTER 36

FIG. 7 (b)

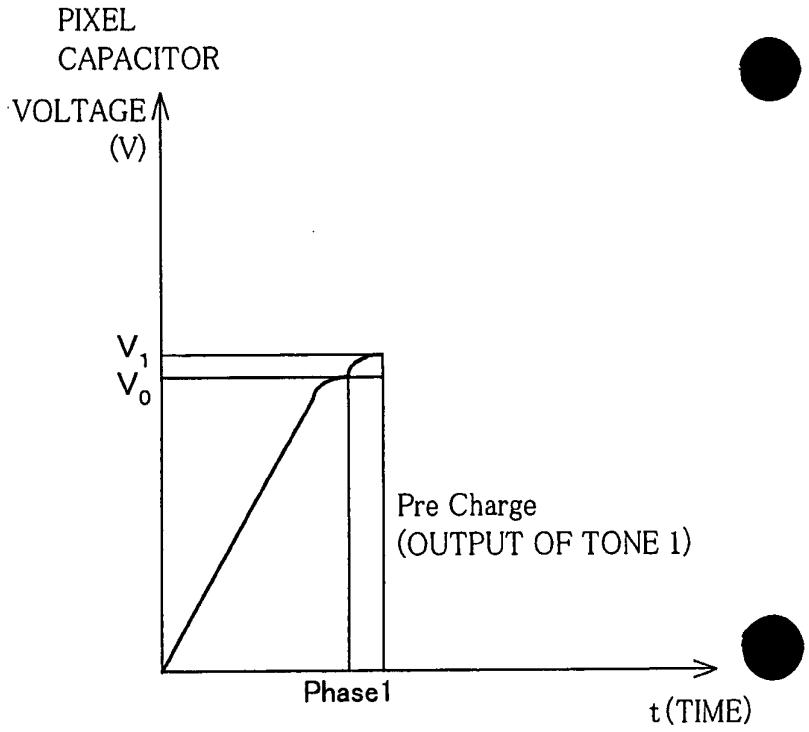

PIXEL
CAPACITOR
VOLTAGE
(V)
V1
V0
Pre Charge
(OUTPUT OF TONE 1)
Phase1
t(TIME)

FIG. 8 (a)

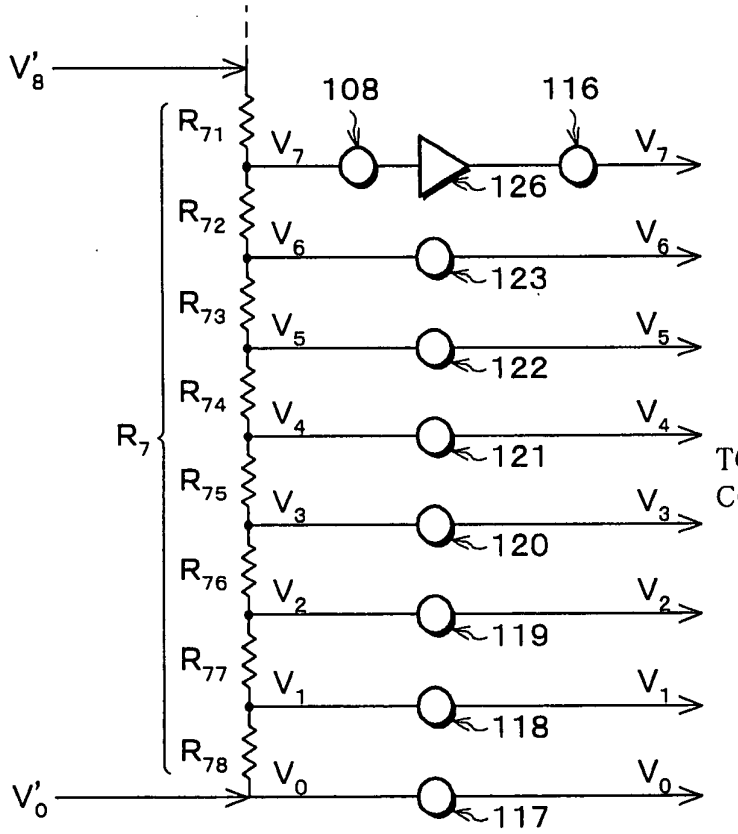

V'8
108
116
R71
V7
V7
126
R72
V6
V6
123
R73
V5
V5
122
R74
V4
V4
121
R7
TO DA
CONVERTER 36
R75
V3
V3
120
R76
V2
V2
119
R77
V1
V1
118
R78
V0
V0
117
V'0

FIG. 8 (b)

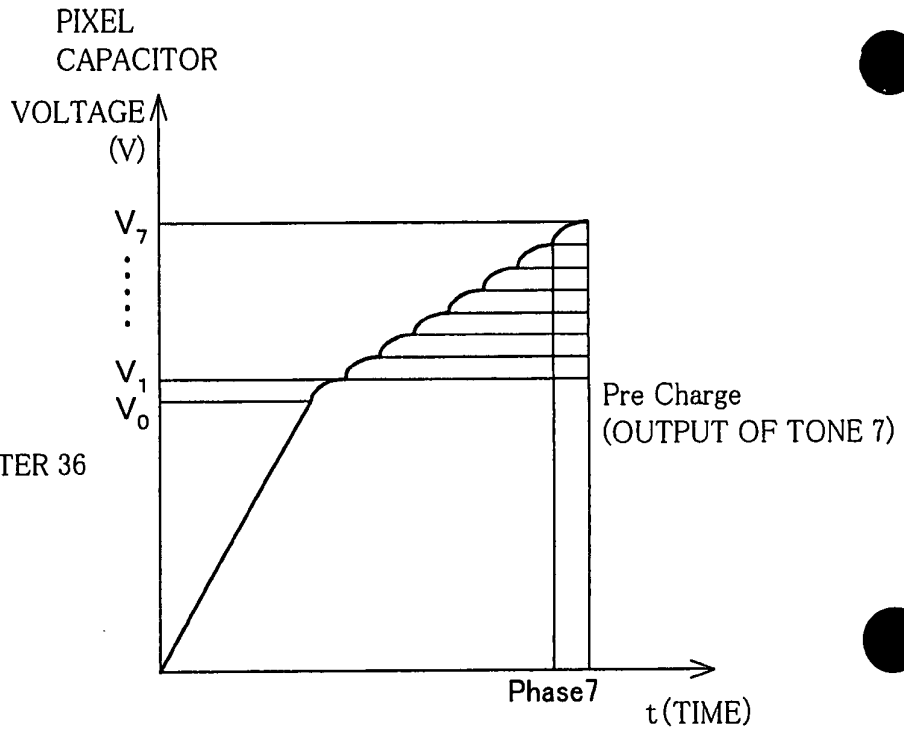

PIXEL
CAPACITOR
VOLTAGE
(V)
V7
V1
V0
Pre Charge
(OUTPUT OF TONE 7)
Phase7
t(TIME)

FIG. 9 (a)

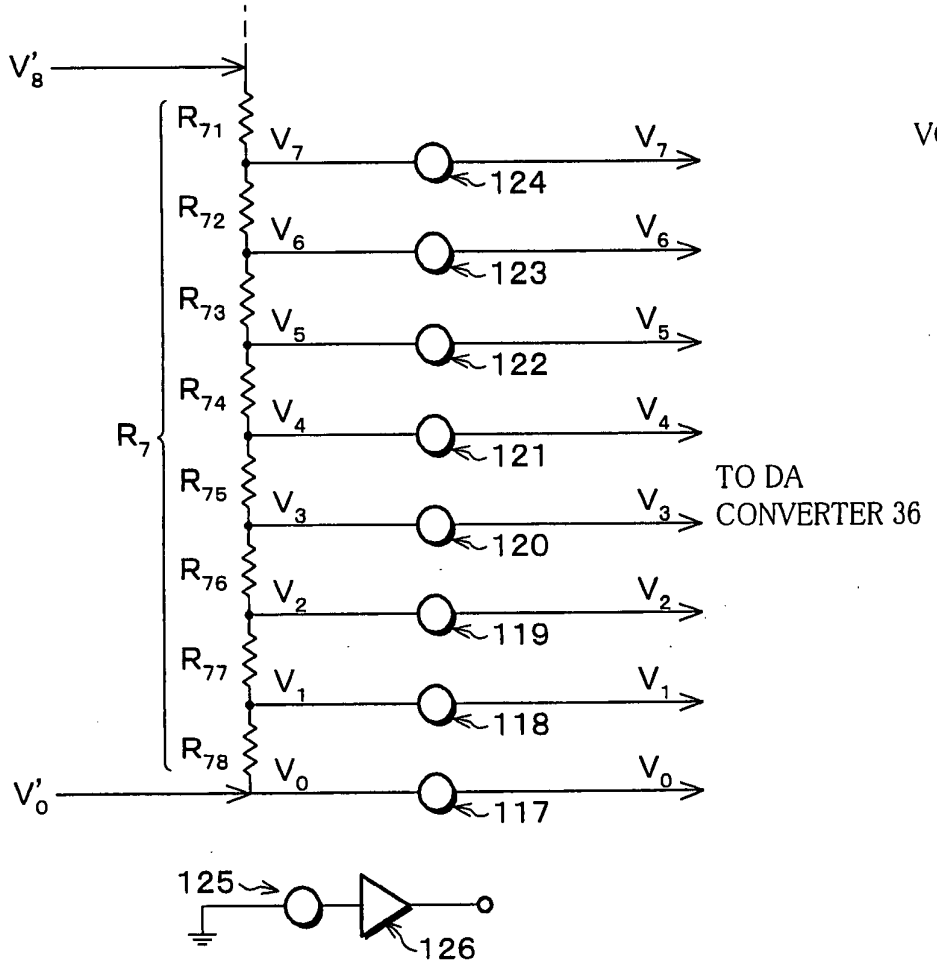

V'8
R71
R72
R73
R74
R7
R75
R76
R77
R78
V'0
V7
V6
V5
V4
V3
V2
V1
V0
124
123
122
121
120
119
118
117
TO DA CONVERTER 36
125
126

FIG. 9 (b)

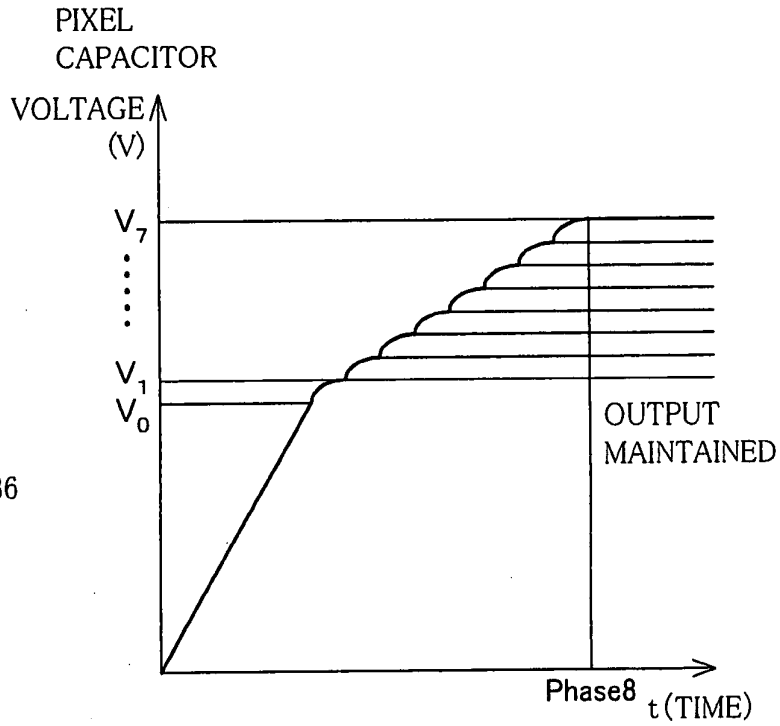

PIXEL CAPACITOR
VOLTAGE (V)
V7
V1
V0
OUTPUT MAINTAINED
Phase8
t (TIME)

FIG. 10

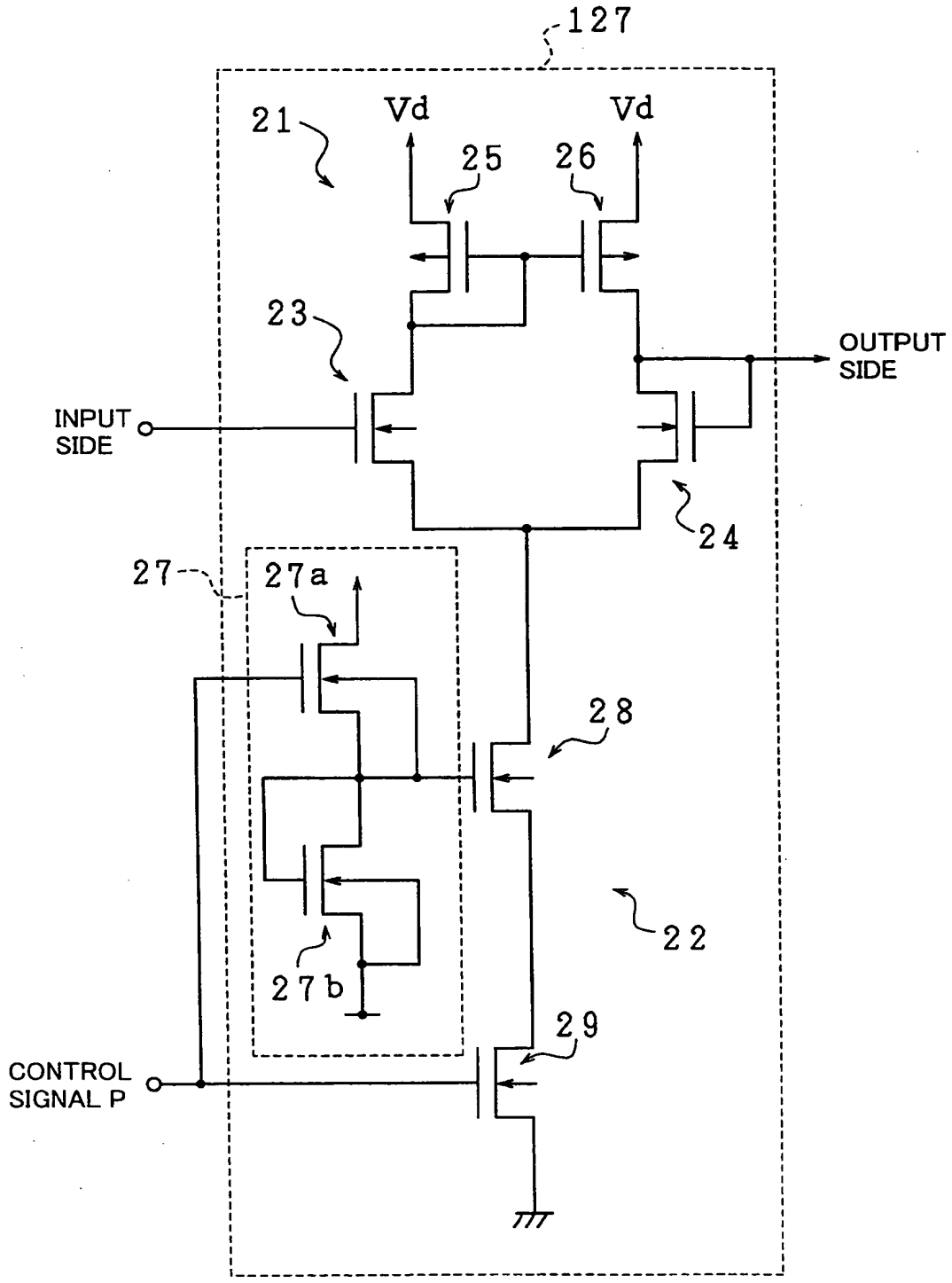

127
21
Vd
Vd
25
26
23
OUTPUT SIDE
INPUT SIDE
24
27
27a
28
22
27b
29
CONTROL SIGNAL P

FIG. 11

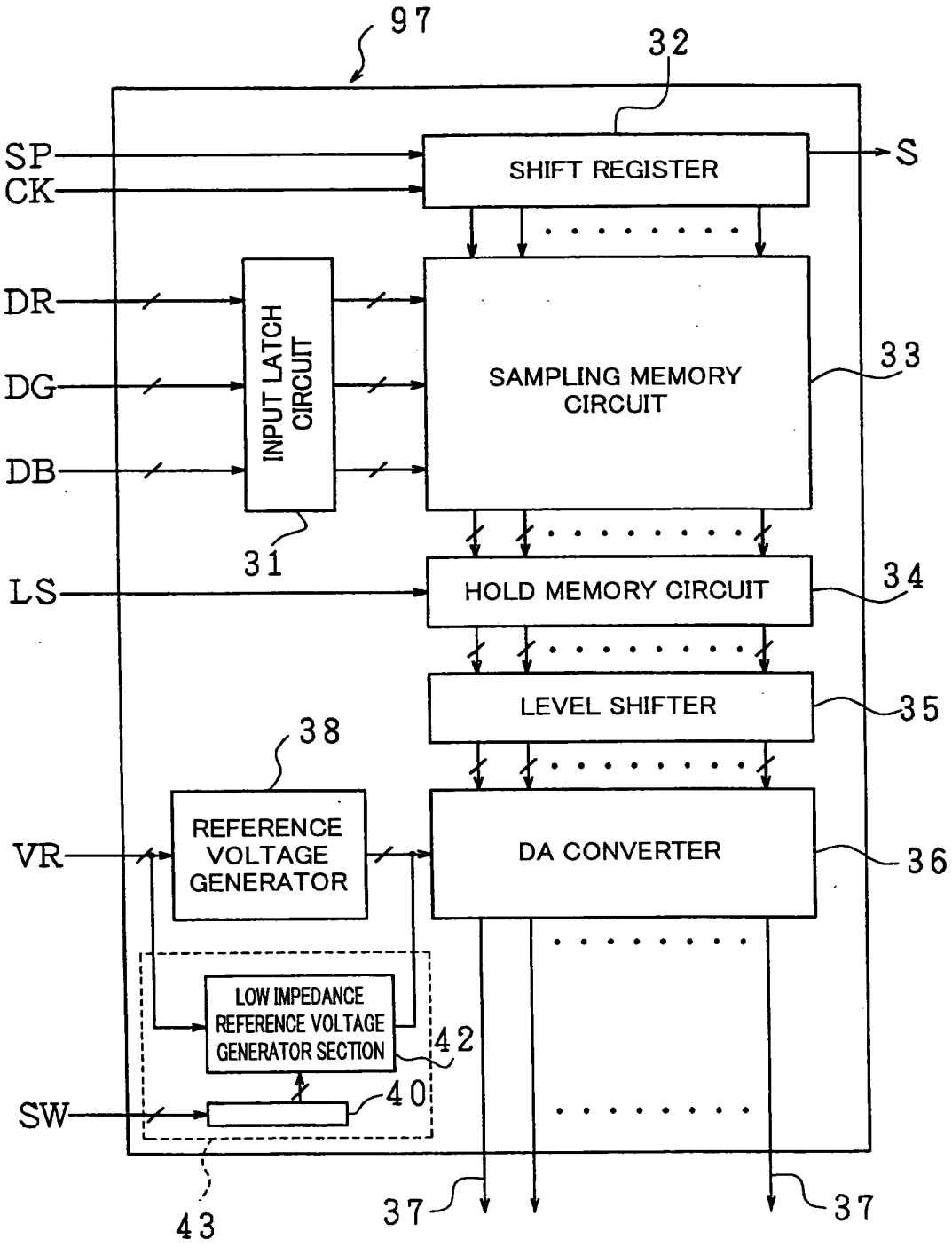

97
32
SP
CK
SHIFT REGISTER
S
DR
DG
DB
INPUT LATCH CIRCUIT
SAMPLING MEMORY CIRCUIT
33
31
LS
HOLD MEMORY CIRCUIT
34
LEVEL SHIFTER
35
38
VR
REFERENCE VOLTAGE GENERATOR
DA CONVERTER
36
LOW IMPEDANCE REFERENCE VOLTAGE GENERATOR SECTION
42
SW
40
43
37
37

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FIG. 12

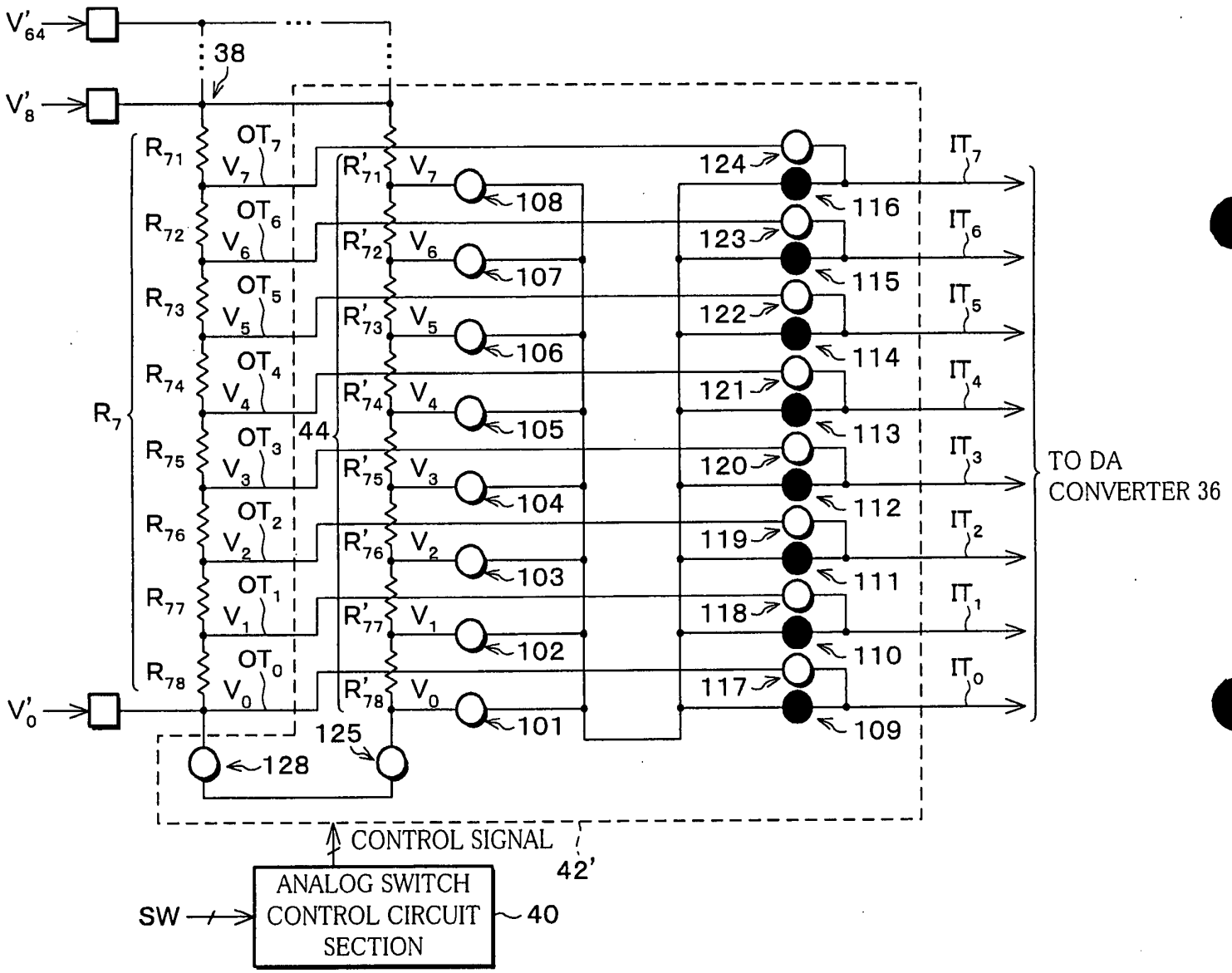


FIG. 13

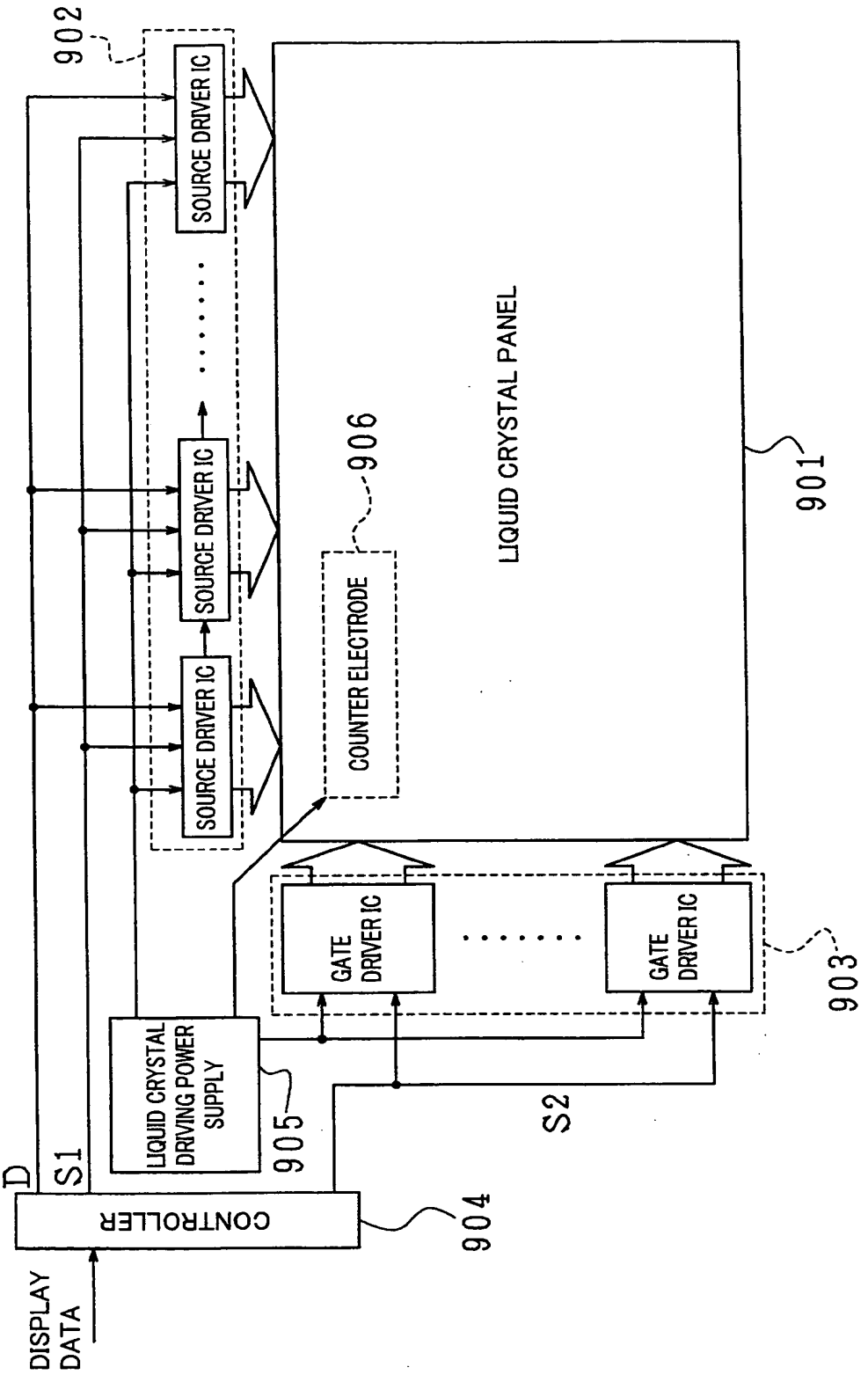

902
SOURCE DRIVER IC
SOURCE DRIVER IC
SOURCE DRIVER IC
906
COUNTER ELECTRODE
LIQUID CRYSTAL PANEL
901
GATE DRIVER IC
GATE DRIVER IC
903
LIQUID CRYSTAL DRIVING POWER SUPPLY
905
S1
S2
D
CONTROLLER
904
DISPLAY DATA

FIG. 14

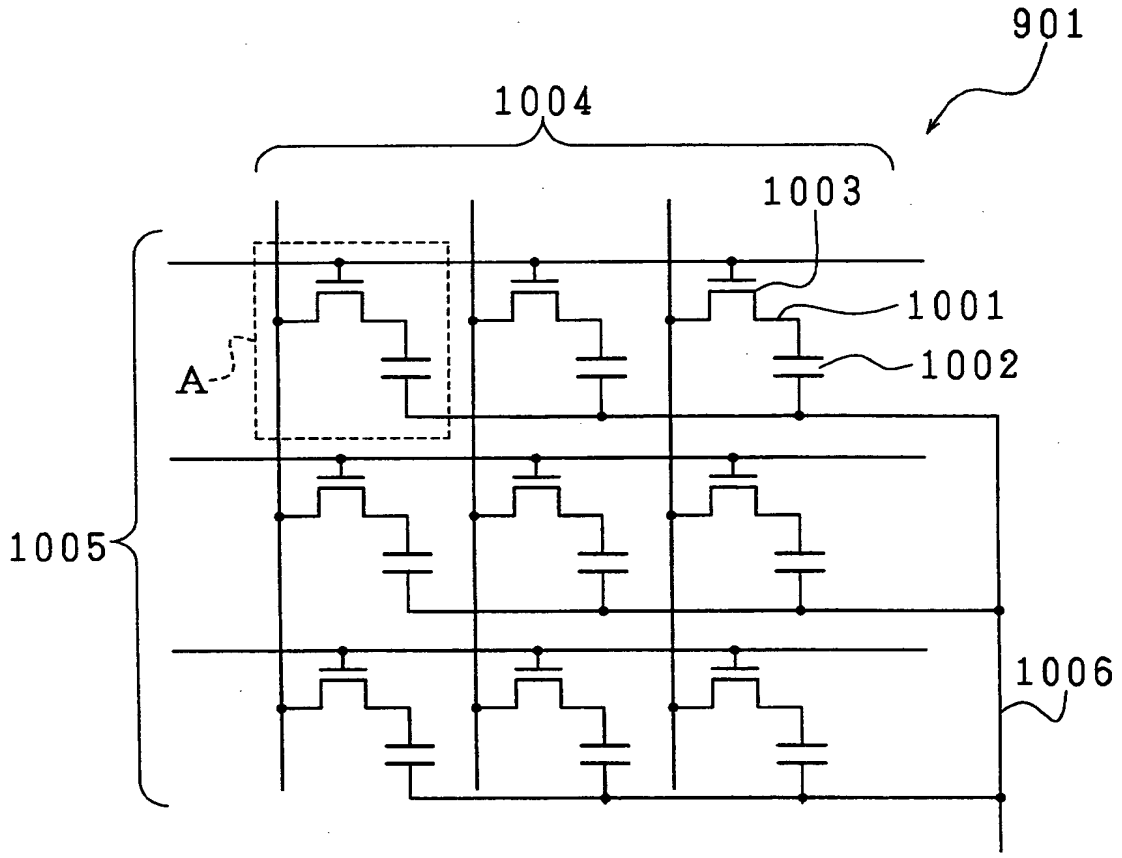


FIG. 15

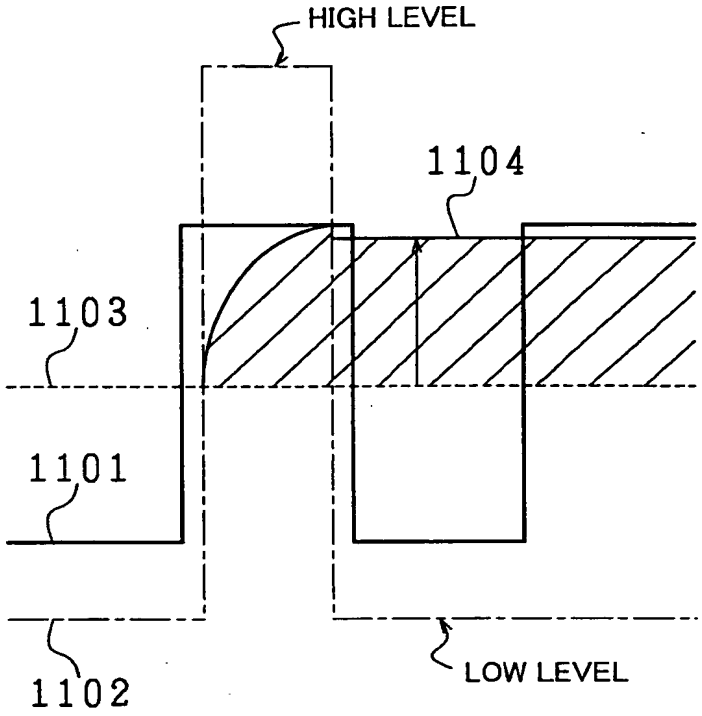

HIGH LEVEL
1104
1103
1101
1102
LOW LEVEL

FIG. 16

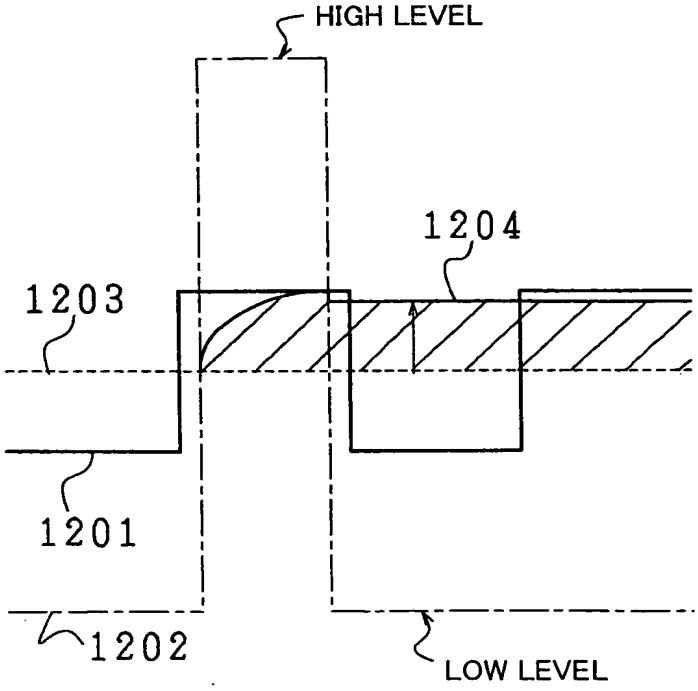

HIGH LEVEL
1204
1203
1201
1202
LOW LEVEL

FIG. 17

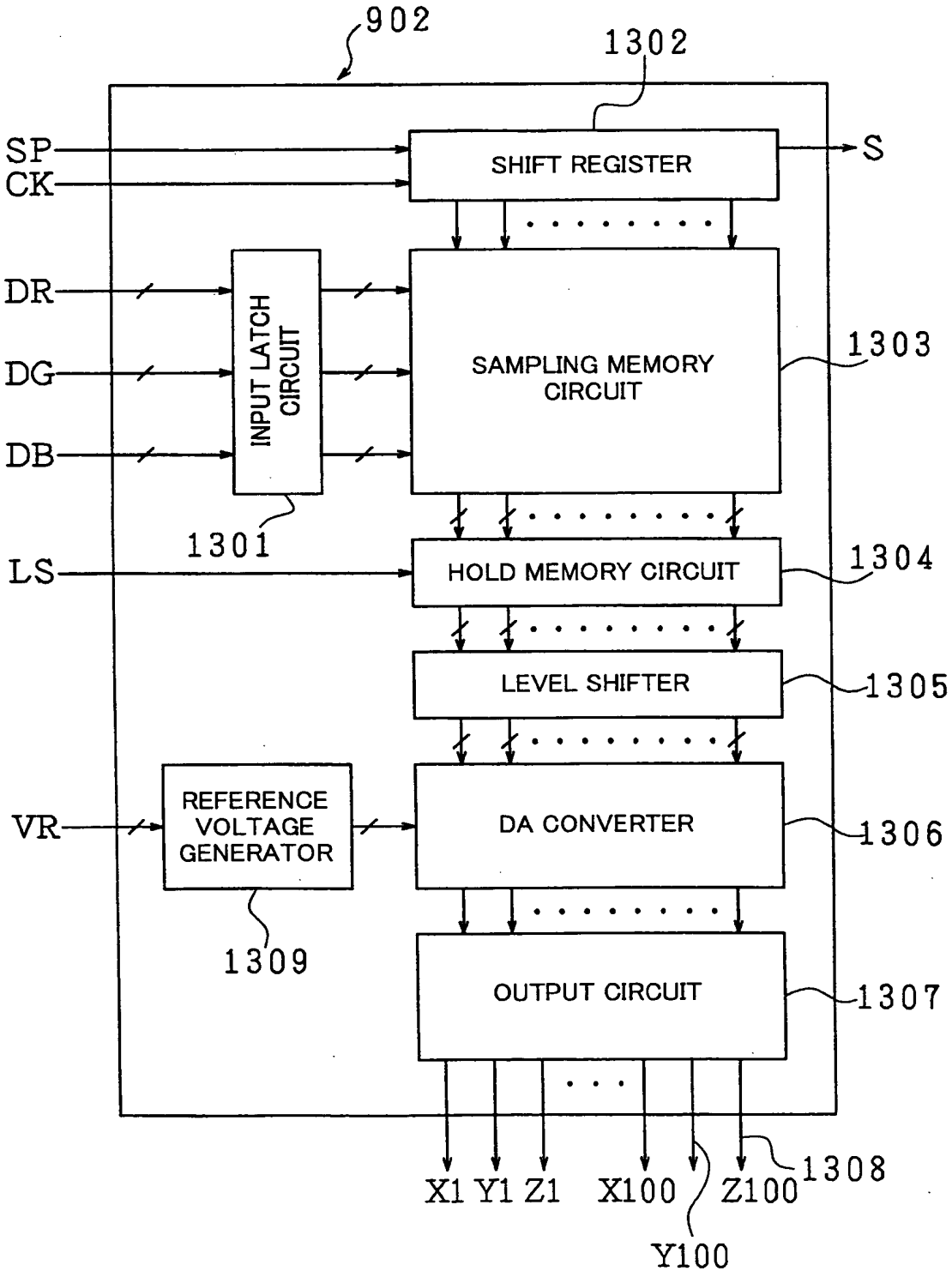

902
1302
SP
CK
SHIFT REGISTER
S
DR
DG
DB
INPUT LATCH CIRCUIT
SAMPLING MEMORY CIRCUIT
1303
1301
LS
HOLD MEMORY CIRCUIT
1304
LEVEL SHIFTER
1305
VR
REFERENCE VOLTAGE GENERATOR
DA CONVERTER
1306
1309
OUTPUT CIRCUIT
1307
X1 Y1 Z1 X100 Z100
1308
Y100

FIG. 18

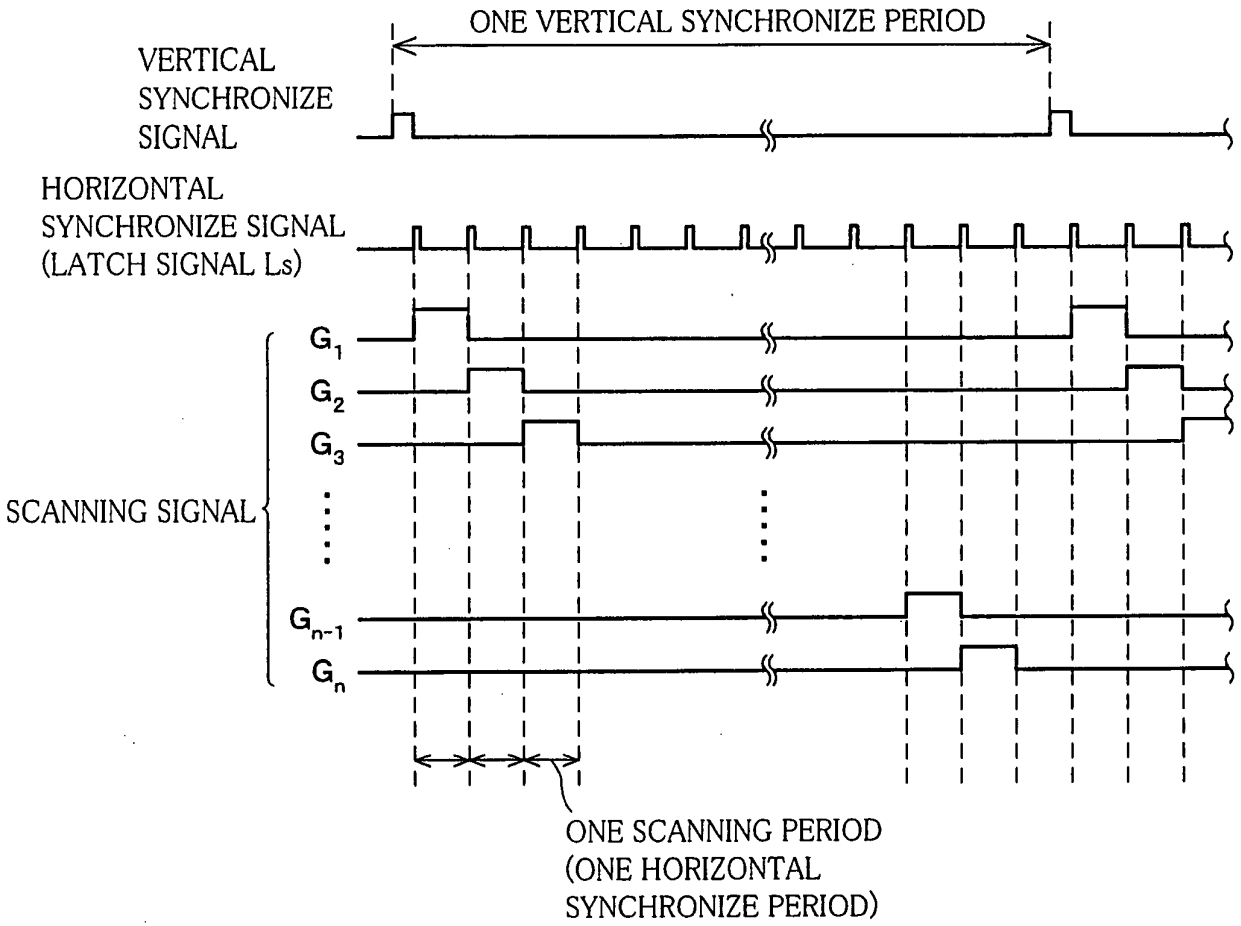

ONE VERTICAL SYNCHRONIZE PERIOD
VERTICAL SYNCHRONIZE SIGNAL
HORIZONTAL SYNCHRONIZE SIGNAL (LATCH SIGNAL Ls)
SCANNING SIGNAL
G1
G2
G3
Gn-1
Gn
ONE SCANNING PERIOD (ONE HORIZONTAL SYNCHRONIZE PERIOD)

FIG.19 (a)

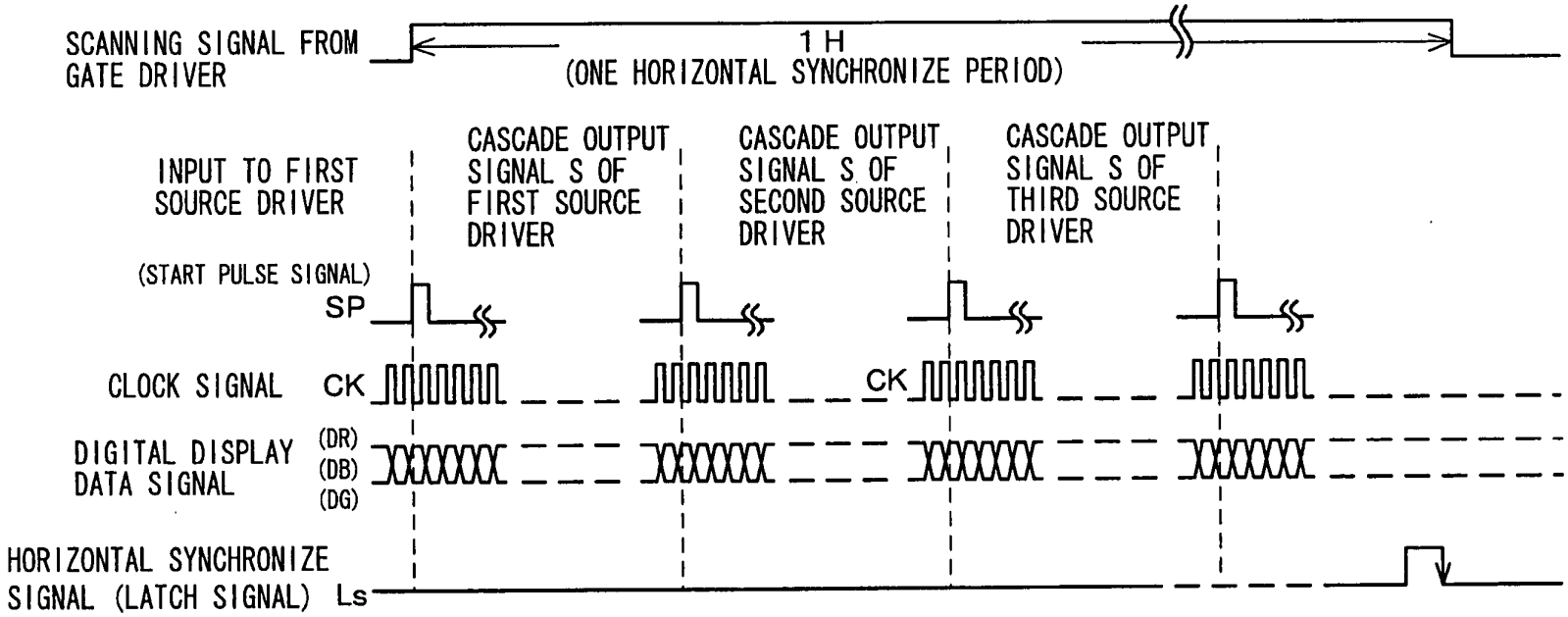


FIG.19 (b)

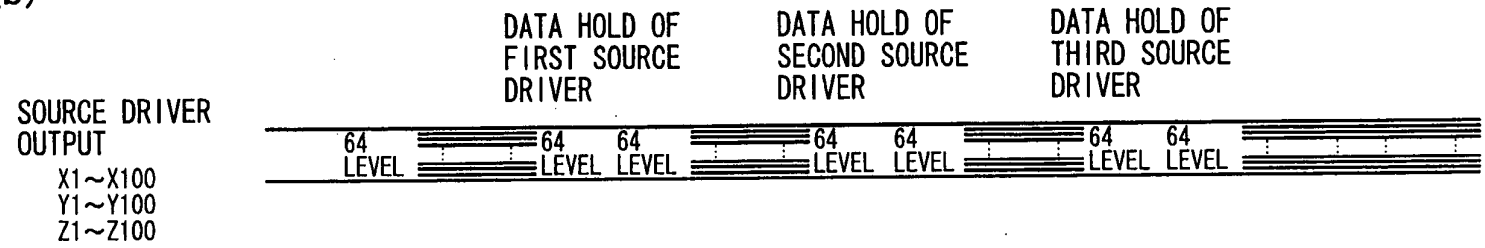


FIG. 20

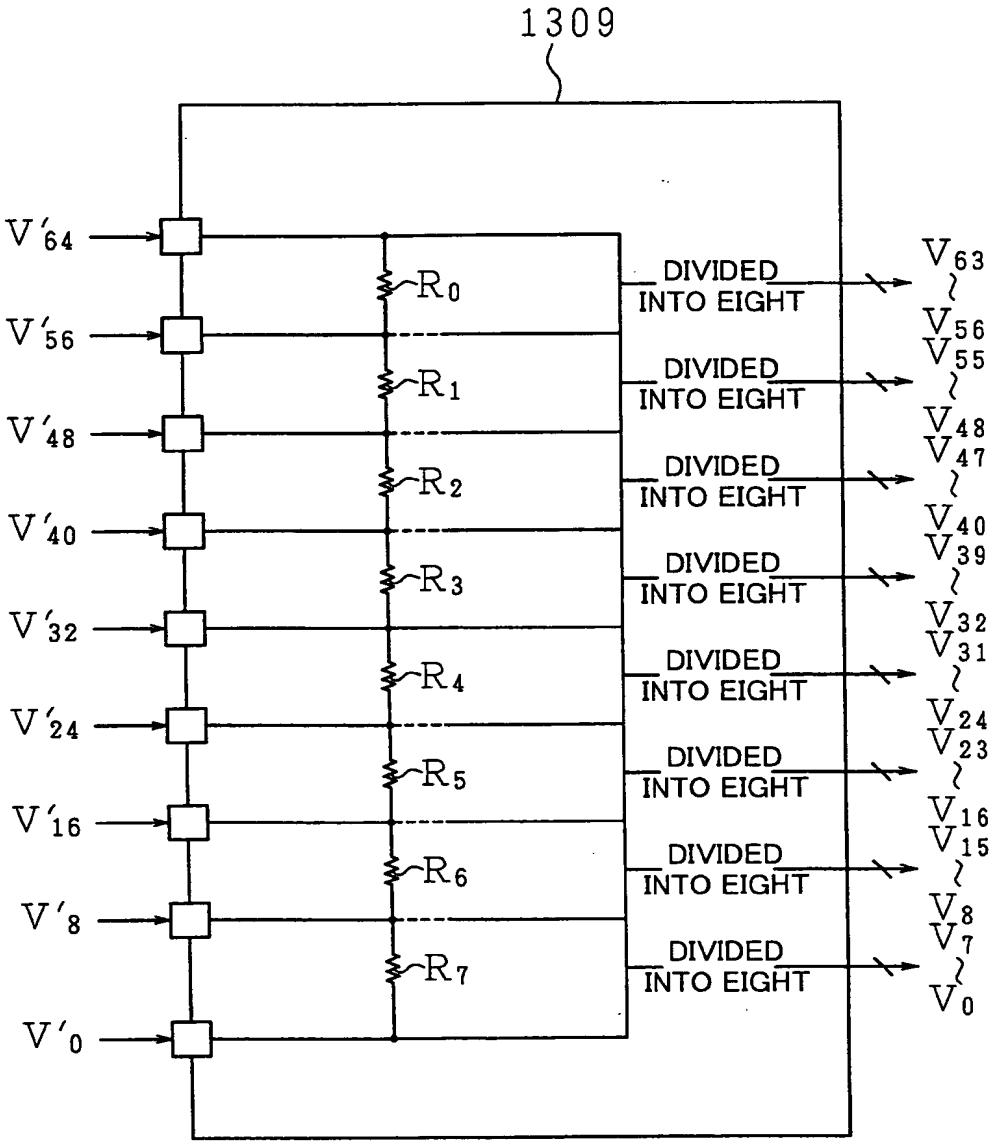

1309
V'64
V'56
V'48
V'40
V'32
V'24
V'16
V'8
V'0
R0
R1
R2
R3
R4
R5
R6
R7
DIVIDED INTO EIGHT
DIVIDED INTO EIGHT
DIVIDED INTO EIGHT
DIVIDED INTO EIGHT
DIVIDED INTO EIGHT
DIVIDED INTO EIGHT
DIVIDED INTO EIGHT
DIVIDED INTO EIGHT
V63 ~ V56
V55 ~ V48
V47 ~ V40
V39 ~ V32
V31 ~ V24
V23 ~ V16
V15 ~ V8
V7 ~ V0

FIG. 21

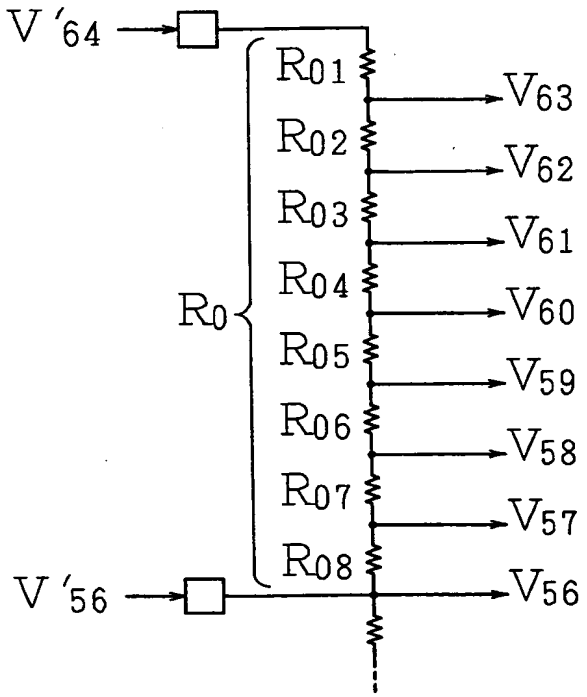

V '64
R01
R02
R03
R04
R0
R05
R06
R07
R08
V '56
V63
V62
V61
V60
V59
V58
V57
V56

FIG. 22

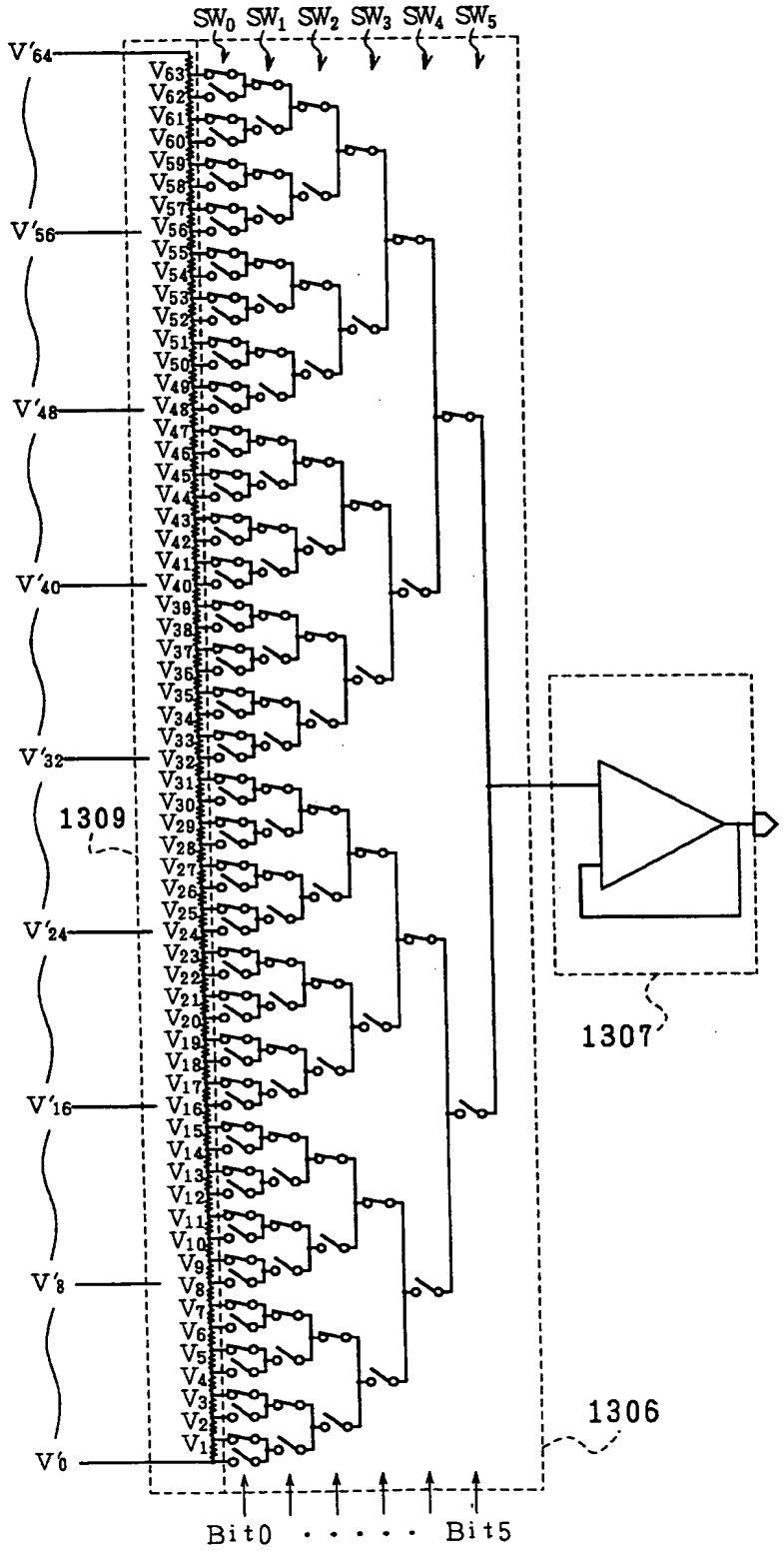

SW0 SW1 SW2 SW3 SW4 SW5
V'64
V'56
V'48
V'40
V'32
V'24
V'16
V'8
V'0
1309
1307
1306
Bit0 . . . . . Bit5

FIG. 23

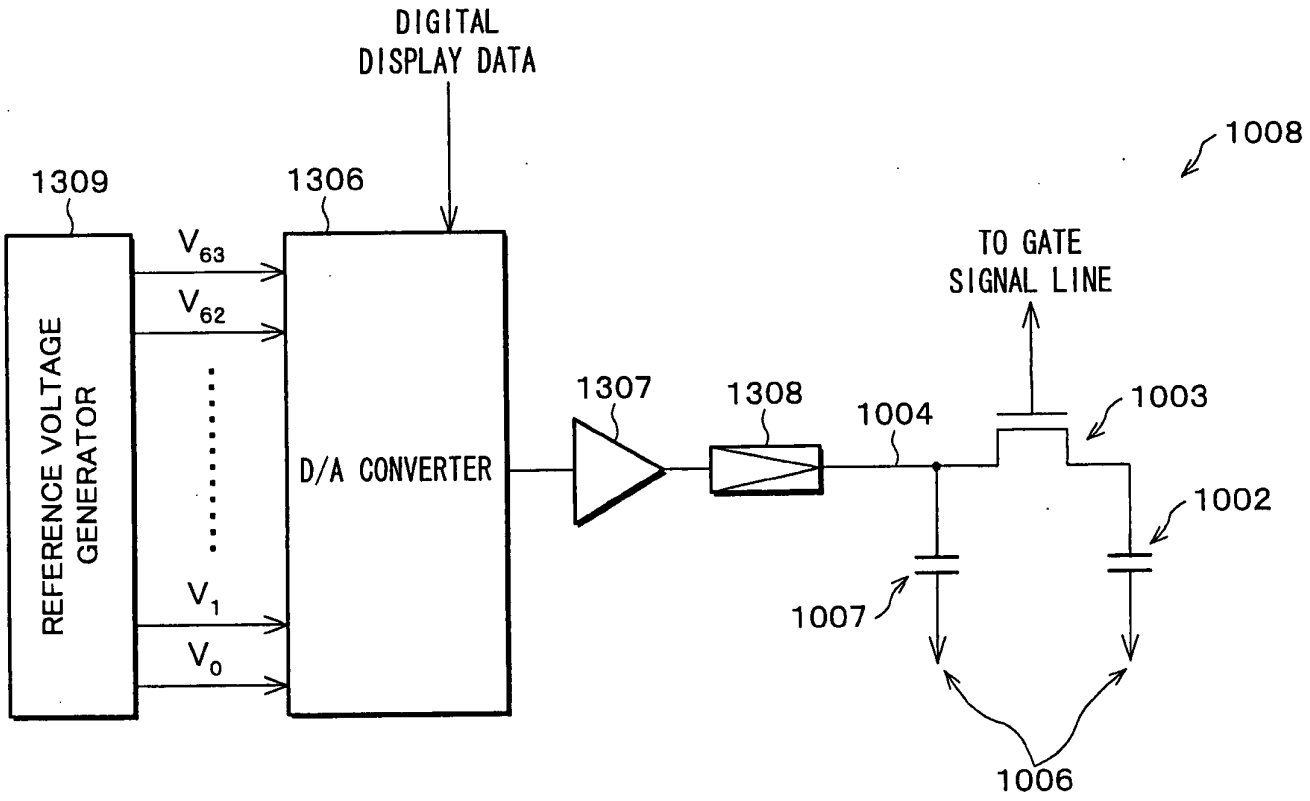
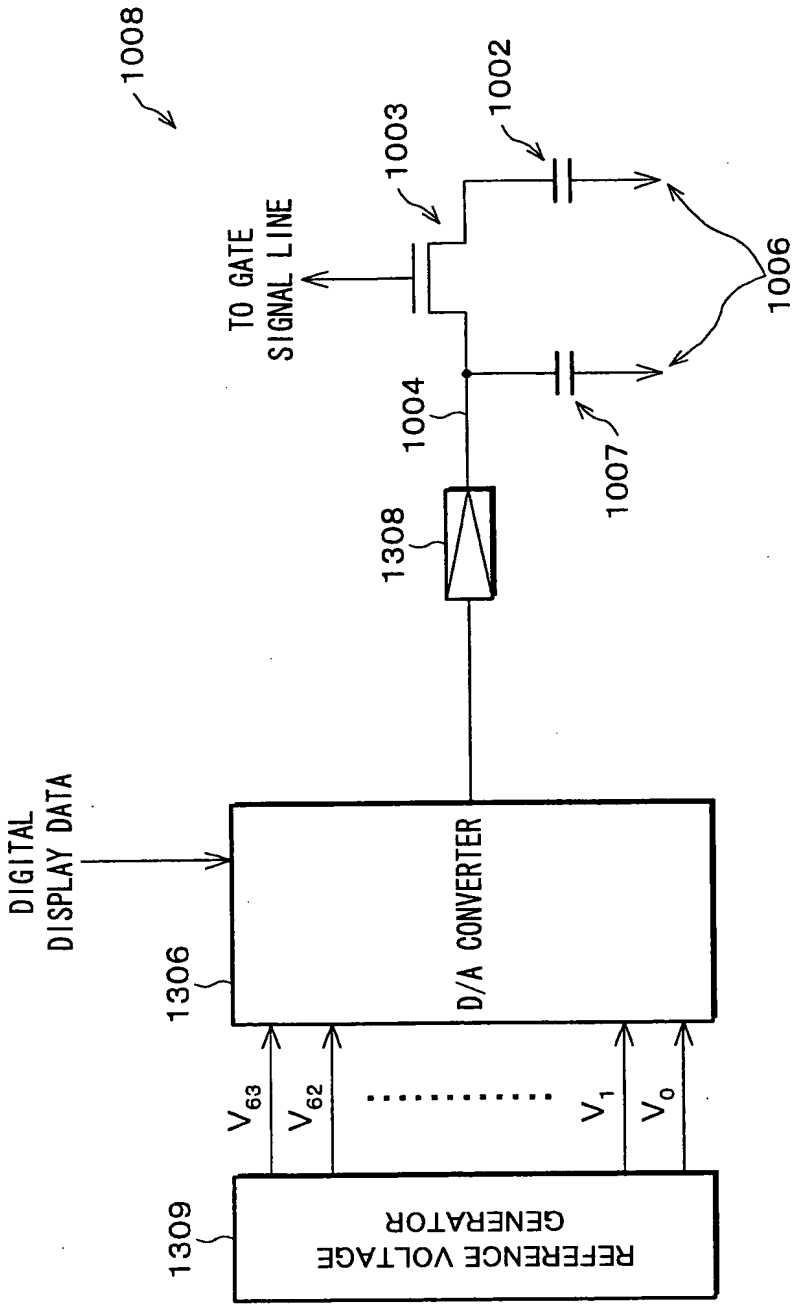

DIGITAL
DISPLAY DATA
1008
1309
1306
REFERENCE VOLTAGE GENERATOR
V_{63}
V_{62}
V_1
V_0
D/A CONVERTER
1307
1308
1004
TO GATE
SIGNAL LINE
1003
1002
1007
1006

FIG. 24


1008
1002
1003
TO GATE
SIGNAL LINE
1006
1004
1007
1308
DIGITAL
DISPLAY DATA
1306
D/A CONVERTER
V_{63}
V_{62}
V_1
V_0
1309
REFERENCE VOLTAGE
GENERATOR

TOSTOT-0156A2660

FIG. 25

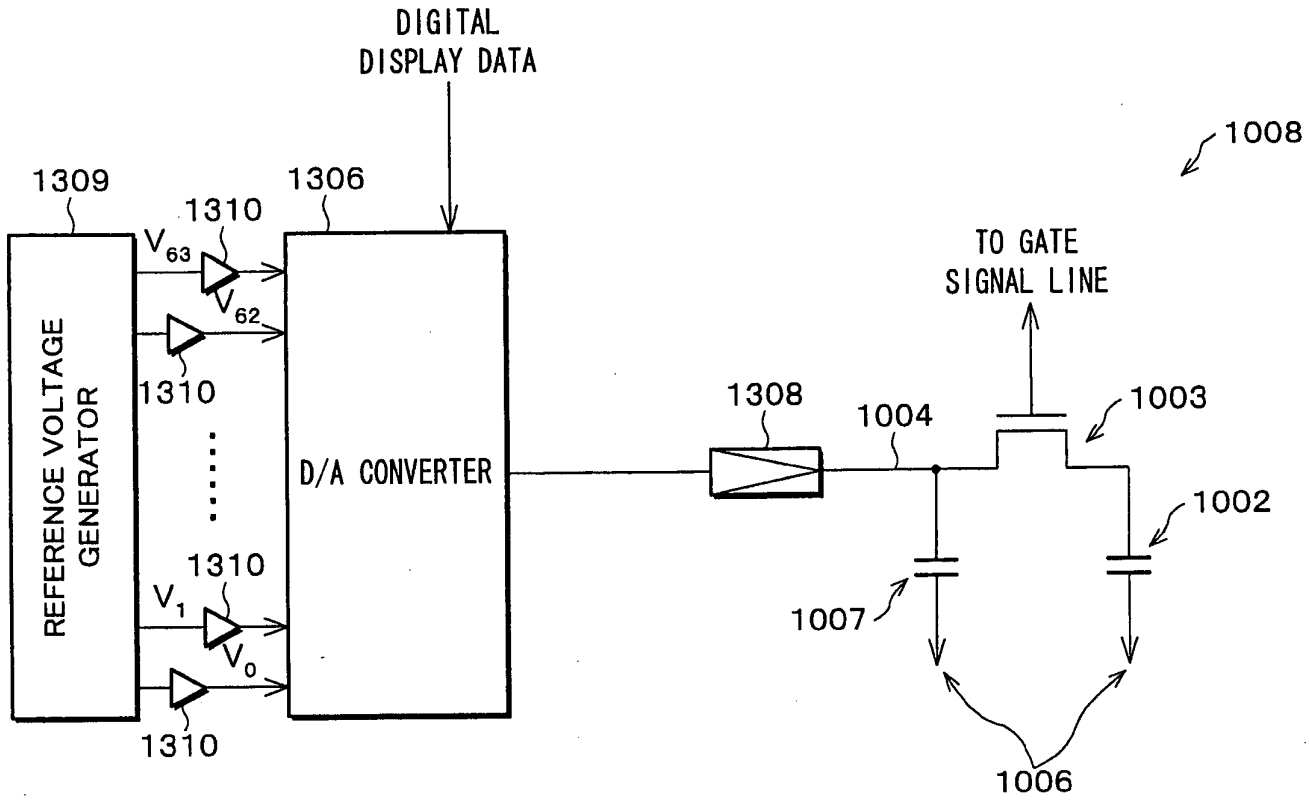


FIG. 26 (a)

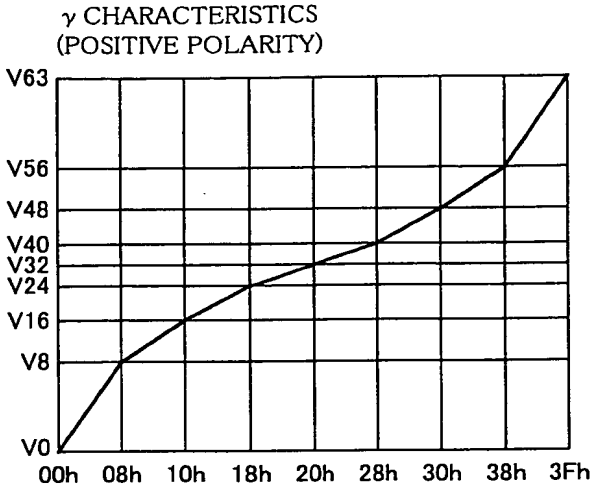


FIG. 26 (b)

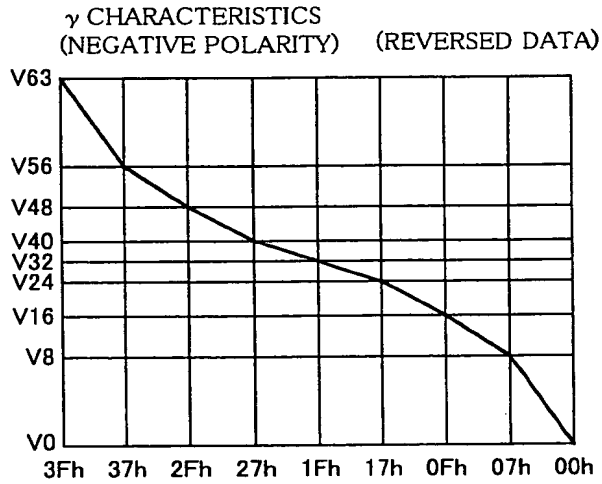


FIG. 26 (c)

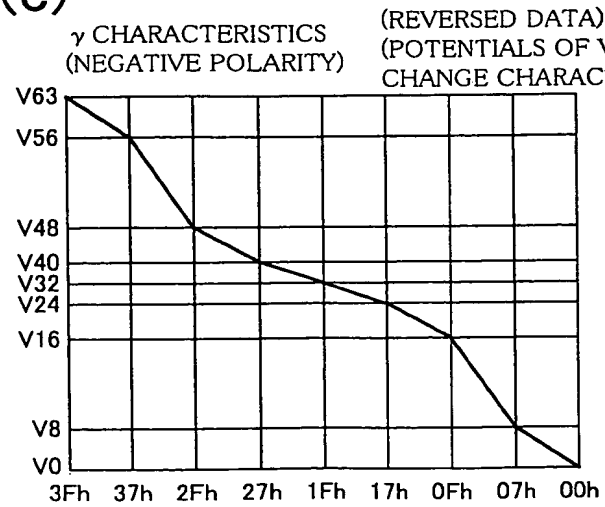


FIG. 27

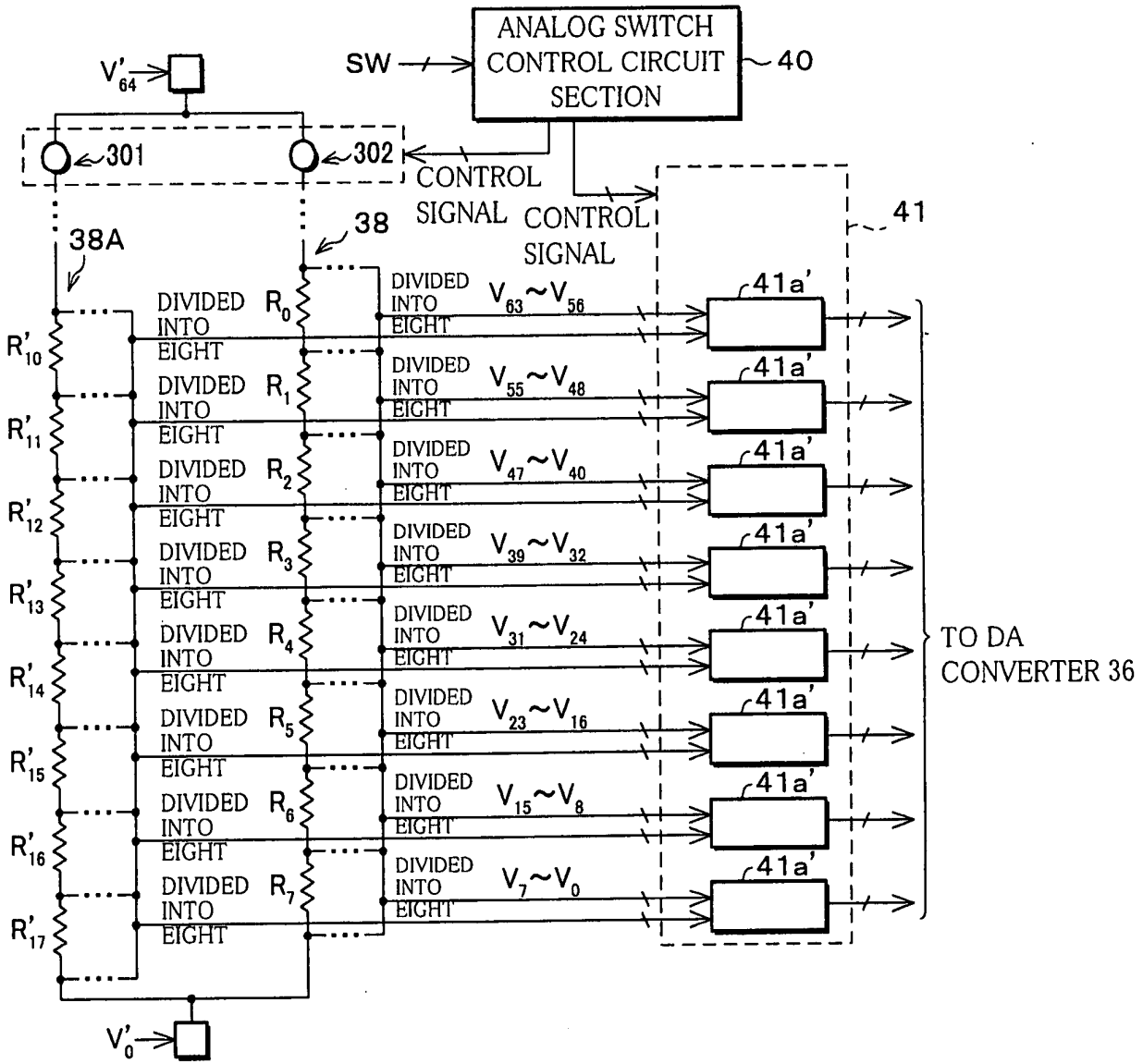

ANALOG SWITCH CONTROL CIRCUIT SECTION
40
SW
V'_{64}
V'_0
301
302
CONTROL SIGNAL
CONTROL SIGNAL
38
38A
41
41a'
DIVIDED INTO EIGHT
R_0
R_1
R_2
R_3
R_4
R_5
R_6
R_7
R'_{10}
R'_{11}
R'_{12}
R'_{13}
R'_{14}
R'_{15}
R'_{16}
R'_{17}
V_{63}~V_{56}
V_{55}~V_{48}
V_{47}~V_{40}
V_{39}~V_{32}
V_{31}~V_{24}
V_{23}~V_{16}
V_{15}~V_8
V_7~V_0
TO DA CONVERTER 36

FIG. 28

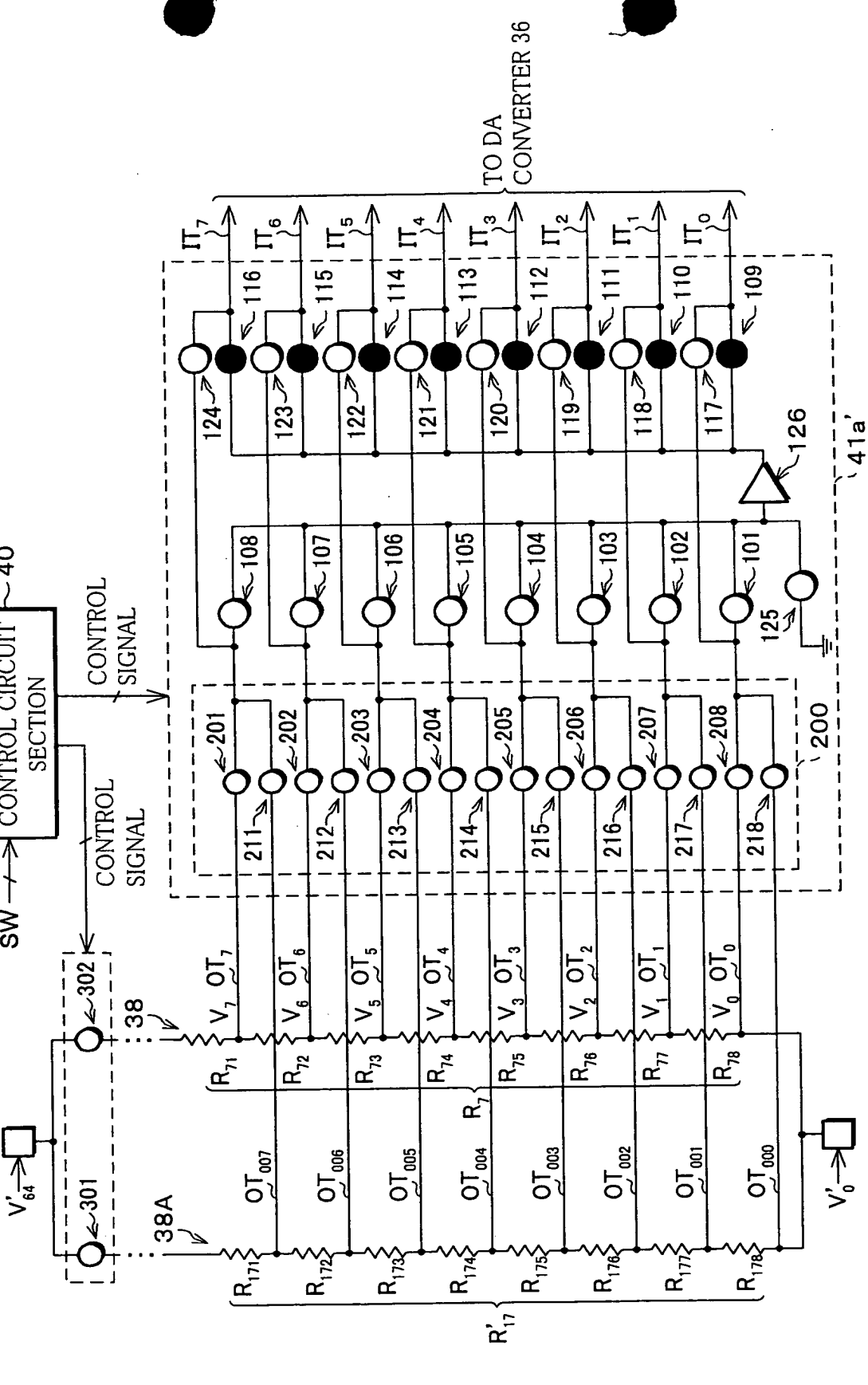
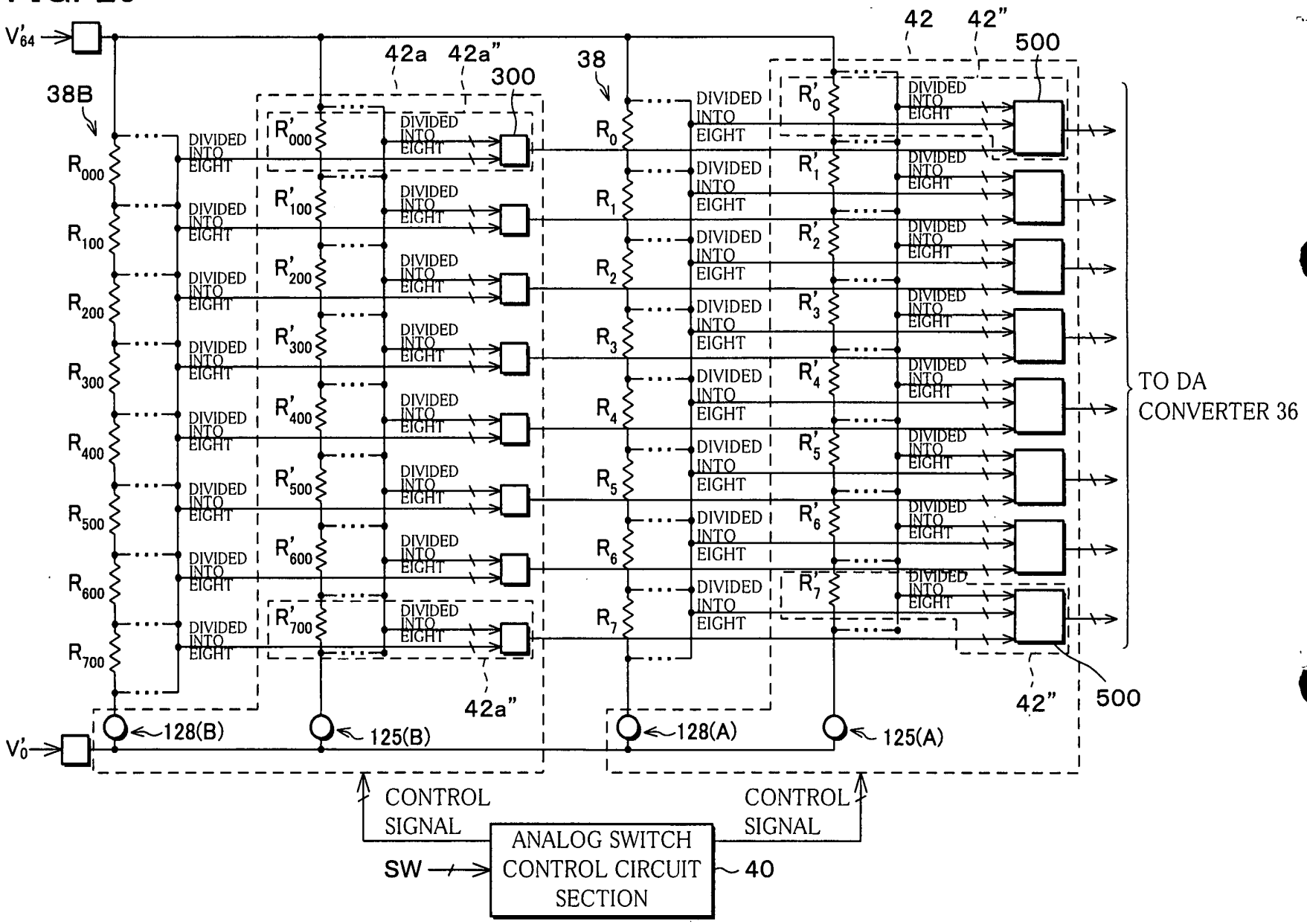

ANALOG SWITCH CONTROL CIRCUIT SECTION
40
CONTROL SIGNAL
CONTROL SIGNAL
SW
TO DA CONVERTER 36
41a'
200
126
125
38
38A
301
302
V'_{64}
V'_0
R'_{17}

FIG. 29


V'64
V'0
38B
38
42a
42a"
300
42
42"
500
R000
R100
R200
R300
R400
R500
R600
R700
R'000
R'100
R'200
R'300
R'400
R'500
R'600
R'700
R0
R1
R2
R3
R4
R5
R6
R7
R'0
R'1
R'2
R'3
R'4
R'5
R'6
R'7
DIVIDED INTO EIGHT
128(B)
125(B)
128(A)
125(A)
TO DA CONVERTER 36
CONTROL SIGNAL
CONTROL SIGNAL
SW
ANALOG SWITCH CONTROL CIRCUIT SECTION
40

TOSHIBA 06h2660

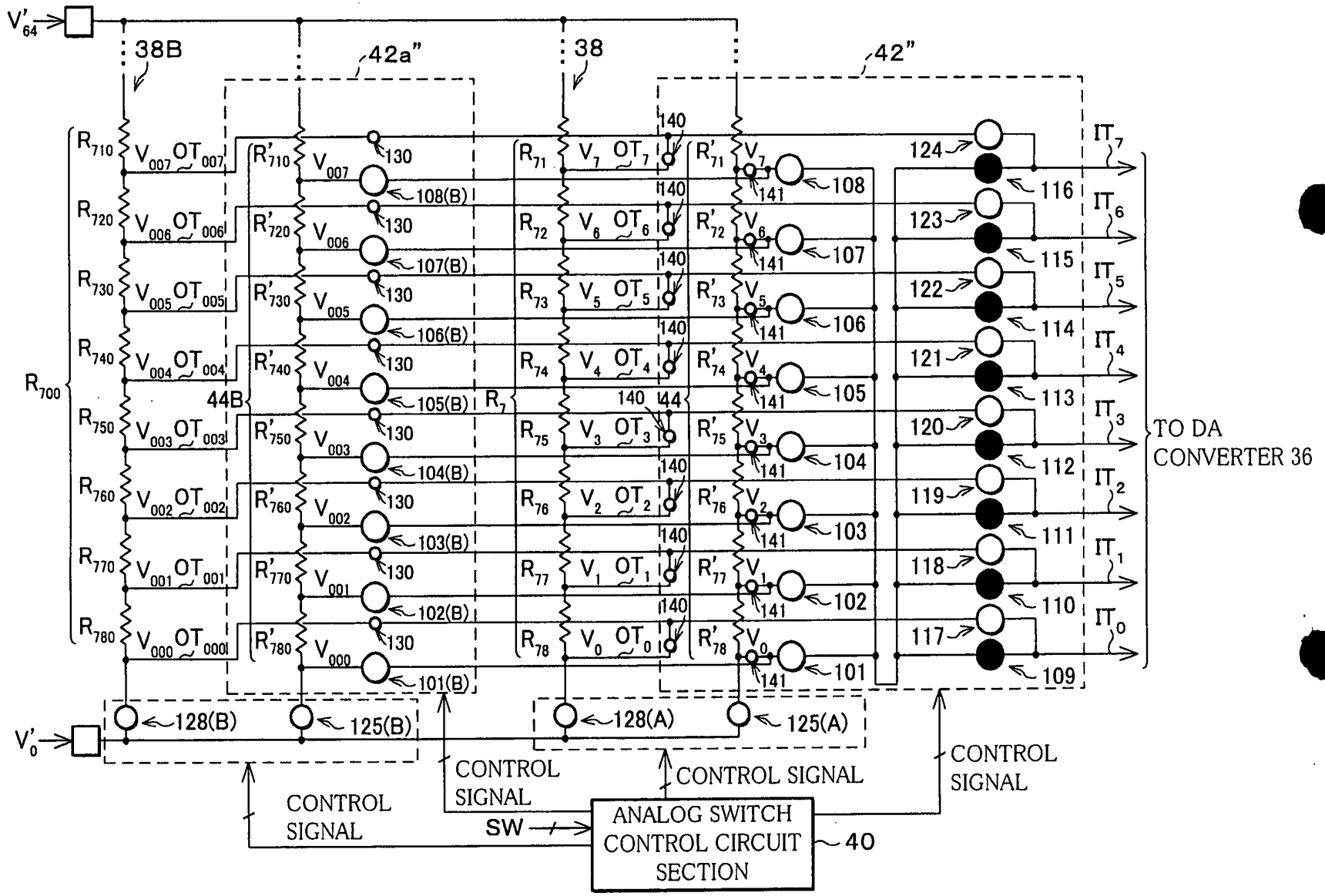



FIG. 30